



**ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΣΕΡΡΩΝ
ΣΧΟΛΗ ΤΕΧΝΟΛΟΓΙΚΩΝ ΕΦΑΡΜΟΓΩΝ ΤΜΗΜΑ
ΜΗΧΑΝΙΚΩΝ ΠΛΗΡΟΦΟΡΙΚΗΣ**

Πτυχιακή Εργασία

**«ΑΝΑΠΤΥΞΗ ΕΚΠΑΙΔΕΥΤΙΚΟΥ ΠΑΚΕΤΟΥ ΑΣΚΗΣΕΩΝ ΣΤΟ MATLAB
ΓΙΑ ΤΑ ΦΑΙΝΟΜΕΝΑ ΤΩΝ ΧΗΜΙΚΩΝ ΑΠΟΤΕΛΕΣΜΑΤΩΝ ΤΟΥ
ΗΛΕΚΤΡΙΚΟΥ ΡΕΥΜΑΤΟΣ»**

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ΠΡΟΛΟΓΟΣ

Η πτυχιακή μου εργασία αποτελεί την κορύφωση των σπουδών μου στο Τ.Ε.Ι Σερρών, τμήμα Μηχανικών Πληροφορικής και αποτελεί εργασία έρευνας , μελέτης και καταγραφής που περιγράφει αναλυτικά τα φαινόμενα των χημικών αποτελεσμάτων του ηλεκτρικού ρεύματος μέσω της ανάπτυξης ενός εκπαιδευτικού πακέτου ασκήσεων στο Matlab.

Στο πρώτο κεφάλαιο δίνεται μια συνοπτική περιγραφή για τα χημικά αποτελέσματα του ηλεκτρικού ρεύματος καθώς και μια ιστορική ανασκόπηση για τον ηλεκτρισμό. Στο δεύτερο κεφάλαιο δίνεται μια συνοπτική περιγραφή στο περιβάλλον του Matlab και παρουσιάζονται αναλυτικά και οι τρεις ασκήσεις. Τέλος, στο τρίτο κεφάλαιο δίνεται ολόκληρος ο κώδικας της εφαρμογής των εκπαιδευτικών ασκήσεων στο Matlab.

Θα ήθελα να τονίσω τον χαρακτήρα της εργασίας αυτής και να επισυμάνω τον σκοπό της. Σαφώς η μελέτη μου στηρίχθηκε σε επιστημονικά κείμενα, όμως το κυριότερο μέρος της εργασίας αυτής στηρίχθηκε στην πρακτική εφαρμογή και στην υλοποίηση των ασκήσεων στο περιβάλλον του Matlab με την υποστήριξη και την βοήθεια του κ.Απόστολου Κουιρουκίδη.



ΕΥΧΑΡΙΣΤΙΕΣ

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Κεφάλαιο 1

• Βασική θεωρία ηλεκτρισμού

1.1 Ιστορική Ανασκόπηση

Η μελέτη του ηλεκτρισμού έχει τις ρίζες του σε μια παρατήρηση του Θαλή του Μιλήσιου (~600 π.Χ.): Ένα κομμάτι ήλεκτρου που τρίβεται σε ξηρό ύφασμα έλκει μικρά κομμάτια άχυρου.

Η μελέτη του μαγνητισμού αρχίζει από την παρατήρηση (άγνωστο πότε για πρώτη φορά και από ποιον) ότι μερικά φυσικά ορυκτά (μαγνητίτη) έλκουν το σίδηρο.

Οι δυο κλάδοι αναπτύχθηκαν ξεχωριστά μέχρι το 1820. Τότε για πρώτη φορά ένας επιστήμονας [ο Hans Christian Oersted (1777-1851)] παρατήρησε μια σχέση μεταξύ τους: ένας **ηλεκτροφόρος αγωγός** επηρεάζει μια μαγνητική βελόνα. Η παρατήρηση αυτή ένωσε τους δύο κλάδους σε έναν νέο, ηλεκτρομαγνητισμό.

Ο κλάδος αυτός αναπτύχθηκε τάχιιστα τους επόμενους 2 αιώνες και συνεχίζει να αναπτύσσεται και στον 21^ο αιώνα.

Μεταξύ των κορυφαίων επιστημόνων που ασχολήθηκαν με τον ηλεκτρομαγνητισμό ήταν οι Michael Faraday (1791-1867) και Τζέιμς Κλερκ Μάξγουελ (1833). Ο τελευταίος διαμόρφωσε τους **νόμους** (δηλαδή τις εξισώσεις του ηλεκτρομαγνητισμού, που είναι γνωστές με την ονομασία **εξισώσεις του Maxwell**). Θεωρούνται τόσο βασικοί για τον Ηλεκτρομαγνητισμό, όσο και εκείνοι του Newton για τη Μηχανική. Αν και ο ίδιος στηρίχθηκε, φυσικά, στις εργασίες των προηγούμενων, συνέβαλε ο ίδιος αποφασιστικά και κυριολεκτικά θεμελίωσε το νέο (σχετικά) αυτό κλάδο της Φυσικής. Εκτός των άλλων, το συμπέρασμά του ότι **το φως είναι ηλεκτρομαγνητικής φύσης** (αν και αργότερα αποδείχθηκε ότι έχει και ιδιότητες ύλης), ένωσε ουσιαστικά και την Οπτική στο "άρμα" του ηλεκτρομαγνητισμού.

Οι εξισώσεις του Maxwell διέπουν τη λειτουργία όλων των συσκευών - εφευρέσεων των τελευταίων αιώνων που αποτέλεσαν εφαρμογές του Ηλεκτρομαγνητισμού και με τη μορφή της Οπτικής: κινητήρες,

ηλεκτρονικοί υπολογιστές, ραδιόφωνα, τηλεοράσεις, ραντάρ, μικροσκόπια, τηλεσκόπια, κ.ά..

Βέβαια, η ανάπτυξη του Ηλεκτρομαγνητισμού δεν τελείωσε με τον Maxwell. Σημαντική ήταν η συμβολή των παρακάτω (και όχι μόνο): Oliver Heaviside (1850-1925), H. A. Lorentz (1853-1928), Heinrich Hertz (1857-1894). Ο τελευταίος, έκανε το επόμενο μεγάλο άλμα μετά τον Maxwell: δημιούργησε τα πρώτα βραχεία ραδιοφωνικά ηλεκτρομαγνητικά κύματα, που ονομάστηκαν "**κύματα Maxwell**".

Η βασική μονάδα μέτρησης της συχνότητας των ηλεκτρομαγνητικών κυμάτων (και όχι μόνο) ονομάστηκε προς τιμή του Hertz και συμβολίζεται διεθνώς με Hz ($1 \text{ Hz} = 1 \text{ s}^{-1}$). Οι εξισώσεις Maxwell όχι μόνο συνεχίζουν να εφαρμόζονται και σήμερα και σε πολλαπλά πρακτικά προβλήματα, αλλά και χρησιμοποιήθηκαν σα βάση σε μια σειρά επεκτάσεις τους, με την ιδέα ότι είναι τμήμα μιας γενικότερης θεωρίας που να ενώνει και άλλους κλάδους της Φυσικής, ίσως και όλους.

1.2 Ηλεκτρικό Ρεύμα

Το **Ηλεκτρικό ρεύμα** είναι η προσανατολισμένη κίνηση ηλεκτρικών φορτίων ή φορέων ηλεκτρικού φορτίου, κατά μήκος ενός ηλεκτροφόρου αγωγού. Ένα παρεμφερές φαινόμενο είναι το ρεύμα μετατόπισης, ποσότητα που σχετίζεται με την αλλαγή του ηλεκτρικού πεδίου.

Μετριέται σε μονάδες μέτρησης της έντασης του ηλεκτρικού ρεύματος και αντιστοιχεί σε αυτό ένα μεταβαλλόμενο μαγνητικό πεδίο.

Από τον ορισμό του ηλεκτρικού ρεύματος προκύπτει ότι για να εμφανιστεί χρειάζονται δύο προϋποθέσεις:

- Η ύπαρξη φορέων ηλεκτρικού φορτίου με ελευθερία κίνησης.
- Αίτιο για την προσανατολισμένη κίνηση των φορέων, δηλαδή κάποιο ηλεκτρικό πεδίο.

Το μέγεθος που μετρά το ηλεκτρικό ρεύμα είναι η **ένταση του ηλεκτρικού ρεύματος**, που ορίζεται ως:

$$I = \frac{dQ}{dt}$$

Δηλαδή ένταση του ηλεκτρικού ρεύματος είναι ο ρυθμός διέλευσης του ηλεκτρικού φορτίου από τη διατομή ενός αγωγού. Πιο απλά, σε συγκεκριμένο χρονικό διάστημα περνάει από τη διατομή του αγωγού ηλεκτρικό φορτίο. Η ένταση του ηλεκτρικού ρεύματος δείχνει πόσο φορτίο περνά στη μονάδα του χρόνου.

Το μέγεθος είναι μονόμετρο, αλλά επιπλέον έχει φορά (διάνυσμα) από τα σημεία ψηλού δυναμικού στα σημεία χαμηλού δυναμικού. Μετρείται στο διεθνές σύστημα μονάδων σε Αμπερ A (γαλλικά Ampere) και θεωρείται θεμελιώδης μονάδα.

Υπάρχουν άλλοι δύο τρόποι με τους οποίους μετράται το ηλεκτρικό ρεύμα, οι οποίοι έχουν σχέση με την κατανομή του στο χώρο. Το ηλεκτρικό ρεύμα μπορεί να διαρρέει έναν μονοδιάστατο αγωγό, μια επιφάνεια ή μια περιοχή του χώρου. Στην περίπτωση που ρέει έναν αγωγό χρησιμοποιείται κανονικά η ένταση του ηλεκτρικού ρεύματος για τη μέτρησή του. Στην περίπτωση της επιφάνειας το ηλεκτρικό ρεύμα τη διαρρέει κατά μέτωπο σαν άπειροι μονοδιάστατοι αγωγοί να έχουν συγκεντρωθεί ο ένας δίπλα στον άλλον και να έχουν σχηματίσει μια επιφάνεια. Τότε χρησιμοποιείται η επιφανειακή πυκνότητα ηλεκτρικού ρεύματος, ένα διανυσματικό μέγεθος με κατεύθυνση την κατεύθυνση του μετώπου σε κάθε σημείο της επιφάνειας και μετράται σε A/m. Αντίστοιχα στο χώρο χρησιμοποιείται η πυκνότητα ηλεκτρικού ρεύματος, και αυτή είναι διανυσματικό μέγεθος με κατεύθυνση την κατεύθυνση του ηλεκτρικού ρεύματος, μετράται σε A/m².

1.3 Ο Νόμος του Ωμ

Ο Νόμος του Ωμ (στα Αγγλικά **Ohm's Law**) συνδέει την Τάση, την Ένταση και την Αντίσταση. Υπάρχουν δύο νόμοι του Ωμ, ο νόμος του Ωμ ανοιχτού κυκλώματος που αναφέρεται σε αντιστάτη και ο νόμος του Ωμ κλειστού κυκλώματος:

Ανοιχτό Κύκλωμα:

Έστω ένας αντιστάτης αντίστασης R, στον οποίον εφαρμόζεται διαφορά δυναμικού V και ο οποίος διαρρέεται από ρεύμα I. Η ένταση του ρεύματος I είναι ανάλογη της διαφοράς δυναμικού με συντελεστή αναλογίας 1/R. Στη μαθηματική γλώσσα αυτή η σχέση γράφεται:

$$I = \frac{V}{R}$$

R όπου R σταθερό

Ο νόμος αυτός μπορεί να εφαρμοστεί και σε ανοιχτό κύκλωμα με περισσότερους αντιστάτες. Ουσιαστικά θεωρούμε ένα ισοδύναμο με το αρχικό κύκλωμα αντίστατη με αντίσταση τέτοια, ώστε να έχει την ίδια συμπεριφορά με το αρχικό κύκλωμα.

Παράδειγμα εφαρμογής νόμου:

- Εφαρμόζουμε μία τάση 2V στα άκρα μιας αντίστασης 4Ω. Πόσο είναι το ρεύμα που διαρρέει την αντίσταση;

$$I = V/R \Rightarrow I = 2/4 \Rightarrow I = 0.5A$$

- Μία λάμπα που είναι συνδεδεμένη σε μία μπαταρία με τάση 6V, διαρρέεται από ρεύμα 60mA. Πόσο είναι η αντίσταση της λάμπας;

$$R = V/I \Rightarrow R = 6/0.06 \Rightarrow R = 100\Omega$$

- Μία αντίσταση 1.2KΩ διαρρέεται από ρεύμα 0.2A. Ποια είναι η τάση στα άκρα της;

$$V = I * R \Rightarrow V = 0.2 * 1200 = 240V$$

Κλειστό Κύκλωμα:

Σε αυτήν την περίπτωση θεωρούμε όλα τα εξαρτήματα του κυκλώματος μαζί με την πηγή. Έστω η συνολική αντίσταση όλων των εξαρτημάτων (εξαιρουμένης της πηγής) R, η εσωτερική αντίσταση της πηγής r, η ηλεκτρεργετική δύναμη της πηγής E και I η ένταση του ηλεκτρικού ρεύματος που διαρρέει το κύκλωμα. Τότε ισχύει:

$$I = \frac{E}{R + r}$$

Περιγραφή της χρήσης του νόμου του Ωμ σε ηλεκτρικά κυκλώματα:

Τα ηλεκτρικά κυκλώματα αποτελούνται από τις ηλεκτρικές συσκευές που συνδέονται με τα καλώδια (ή άλλους κατάλληλους αγωγούς). Το παραπάνω διάγραμμα παρουσιάζει ένα από τα απλούστερα ηλεκτρικά κυκλώματα που μπορούν να κατασκευαστούν. Μια ηλεκτρική συσκευή παρουσιάζεται ως κύκλος με τα σύμβολο (+) και (-) τα τερματικά, τα οποία αντιπροσωπεύουν μια πηγή τάσης, όπως μια μπαταρία. Η άλλη συσκευή εμφανίζεται σαν ένα σύμβολο ζιγκζακ (Αγγλ. zigzag) με το γράμμα (R). Αυτό το σύμβολο αντιπροσωπεύει έναν αντιστάτη, και το (R) υποδεικνύει την αντίστασή του.

Το θετικό τερματικό της πηγής τάσης (+), συνδέεται με ένα από τα τερματικά του αντιστάτη χρησιμοποιώντας ένα καλώδιο αμελητέας αντίστασης και μέσω αυτού του καλωδίου ένα τρέχον ρεύμα (**I**) υποδεικνύεται σε μια διευκρινισμένη κατεύθυνση όπου εμφανίζεται με ένα βέλος. Το άλλο τερματικό του αντιστάτη ή το αρνητικό τερματικό της πηγής τάσης (-), συνδέεται με ένα δεύτερο καλώδιο και στην συνέχεια με την άλλη άκρη του αντιστάτη.

Με αυτό τον τρόπο διαμορφώνουμε ένα πλήρες κύκλωμα επειδή όλο το ρεύμα που αφήνει το θετικό τερματικό της πηγής τάσης (+) πρέπει να επιστρέψει στο άλλο τερματικό της πηγής τάσης (-).

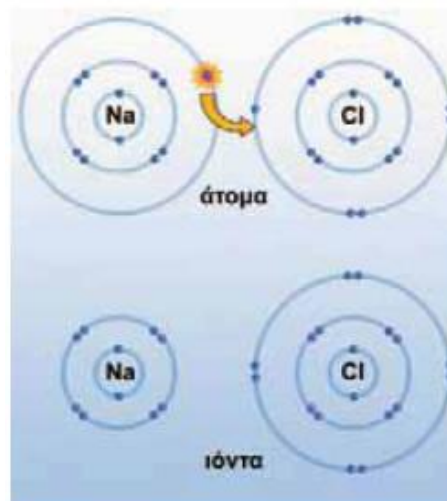
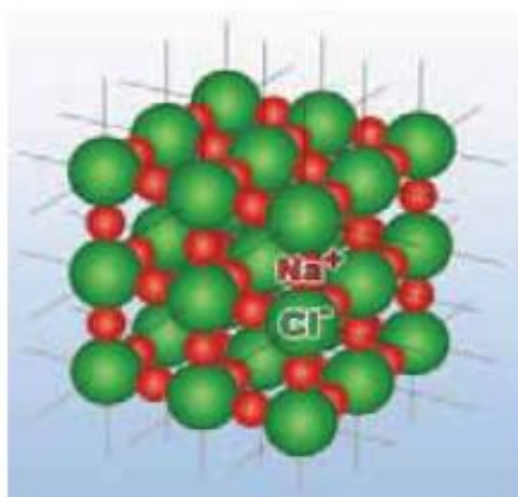
Οι ηλεκτρικοί αντιστάτες είναι αγωγοί που επιβραδύνουν τη μετάβαση της ηλεκτρικής ενέργειας. Ένας αντιστάτης με μια υψηλή τιμή αντίστασης, για παράδειγμα μεγαλύτερη από 10 μέγα ωμ (MΩ), είναι ένας φτωχός αγωγός, ενώ ένας αντιστάτης με μια χαμηλή τιμή, για παράδειγμα λιγότερο από 0,1 ωμ, είναι ένας καλός αγωγός.

(Οι μονωτές είναι ηλεκτρικές συσκευές που για τους περισσότερους πρακτικούς λόγους δεν επιτρέπουν στο ρεύμα να διαρρέει το κύκλωμα όταν εφαρμόζεται η τάση.) Σε ένα διάγραμμα κυκλωμάτων όπως το παραπάνω, τα διάφορα στοιχεία μπορούν να ενωθούν από τους συνδετήρες, τις επαφές, τις συγκολλήσεις ή τις ενώσεις ύλης συγκολλήσεως των διάφορων ειδών, αλλά για την απλότητα αυτές οι συνδέσεις συνήθως δεν παρουσιάζονται.

1.4 Χημικά Αποτελέσματα του Ηλεκτρικού Ρεύματος

ΗΛΕΚΤΡΟΛΥΤΙΚΑ ΔΙΑΛΥΜΑΤΑ

Ως ηλεκτρολύτης αρίζεται κάθε ουσία που περιέχει ελεύθερα ιόντα και συμπεριφέρεται σαν αγωγός του ηλεκτρισμού. Υπάρχουν όμως πέρα από τα υγρά διαλύματα, τηγμένοι ηλεκτρολύτες και στερεοί ηλεκτρολύτες. Ακόμα, ορισμένα αέρια μπορούν να δράσουν ως ηλεκτρολύτες σε συνθήκες υψηλής θερμοκρασίας ή χαμηλής πίεσης. Ένα παράδειγμα ηλεκτρολύτη είναι το χλωριούχο νάτριο το οποίο σχηματίζεται από την ένωση δύο ατόμων, του νατρίου και του χλωρίου, με αποβολή ενός ηλεκτρονίου από το νάτριο και πρόσληψη του ίδιου ηλεκτρονίου από το χλώριο. Μεταξύ των ιόντων νατρίου και χλωρίου αναπτύσσεται ελκτική ηλεκτρική δύναμη. Έτσι, σε συνηθισμένη θερμοκρασία το χλωριούχο νάτριο είναι στερεά ένωση σχηματίζοντας κρυστάλλους.



Όταν το χλωριούχο νάτριο συναντάται σε στερεές ενώσεις, τα ιόντα δεν μπορούν να κινηθούν και επομένως το ηλεκτρικό ρεύμα δεν μπορεί να το διαπεράσει. Όταν όμως το χλωριούχο νάτριο διαλυθεί στο νερό τότε τα μόρια του νερού παρεμβάλλονται μεταξύ των ιόντων και η αλληλεπίδραση των ιόντων εξασθενεί, οπότε οι κρυστάλλοι καταστρέφονται. Έτσι τα ιόντα χλωρίου και νατρίου μπορούν πλέον να

κινούνται ελεύθερα στο διάλυμα και επομένως το ηλεκτρικό ρεύμα μπορεί να το διαπεράσει.

Κεφάλαιο 2

• Περιβάλλον Matlab

2.1 To Matlab

Το MATLAB (matrix laboratory) είναι ένα περιβάλλον αριθμητικής υπολογιστικής και μια προγραμματιστική γλώσσα τέταρτης γενιάς.

Αποθηκεύει και κάνει τις πράξεις με βάση την άλγεβρα μητρών.

Χρησιμοποιείται κατά κύριο λόγο για την επίλυση μαθηματικών προβλημάτων, ωστόσο είναι πολύ "ισχυρό" και μπορεί να χρησιμοποιηθεί και για προγραμματισμό καθώς περιέχει εντολές από την C++ όπως την while, την switch και την if.

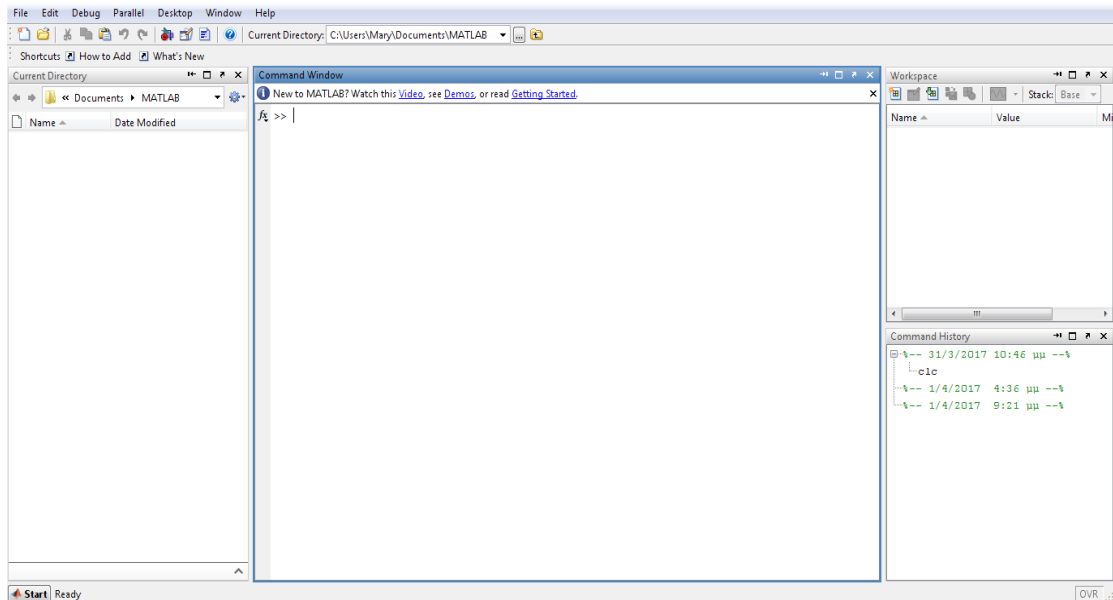
Στον τομέα των γραφικών όσον αφορά τον μαθηματικό κλάδο μπορεί να υλοποιήσει συναρτήσεις πραγματικές, μιγαδικές, πεπλεγμένες συναρτήσεις δύο μεταβλητών και άλλες.

Όσον αφορά τον στατιστικό κλάδο μπορεί να υλοποιήσει ιστογράμματα, τομεογράμματα, ραβδοδιαγράμματα, εμβοδογράμματα και άλλα.

Οι εντολές δίνονται μέσω του παραθύρου εντολών (MATLAB command window).

Οι εντολές αυτές μπορεί να είναι:

1. ορισμοί μεταβλητών και πράξεις
2. κλήση ενσωματωμένων συναρτήσεων της MATLAB και των εγκατεστημένων εργαλειοθηκών της (toolboxes)
3. κλήση συναρτήσεων (functions) ή αρχείων εντολών MATLAB (scripts) που κατασκευάζονται από τους χρήστες με τη μορφή m-file.



Σχήμα . Matlab Window

Στο Σχήμα 2.1 Παρατηρούμε το παράθυρο του Matlab. Το παράθυρο αυτό είναι χωρισμένο σε τρεις στήλες.

Στην αριστερή στήλη βρίσκεται ένα toolbox με ονομασία Current Folder. Στην περιοχή αυτή βρίσκουμε τα αρχεία που θέλουμε να τρέξουμε.

Ακριβώς από κάτω βρίσκεται μία περιοχή που μας εμφανίζει τις συναρτήσεις που υπάρχουν σε κάθε αρχείο που έχουμε επιλέξει στο Current Folder (αν υπάρχουν στο αρχείο αυτό).

Στην δεξιά στήλη βρίσκονται δύο περιοχές. Το Workspace και το Command History.

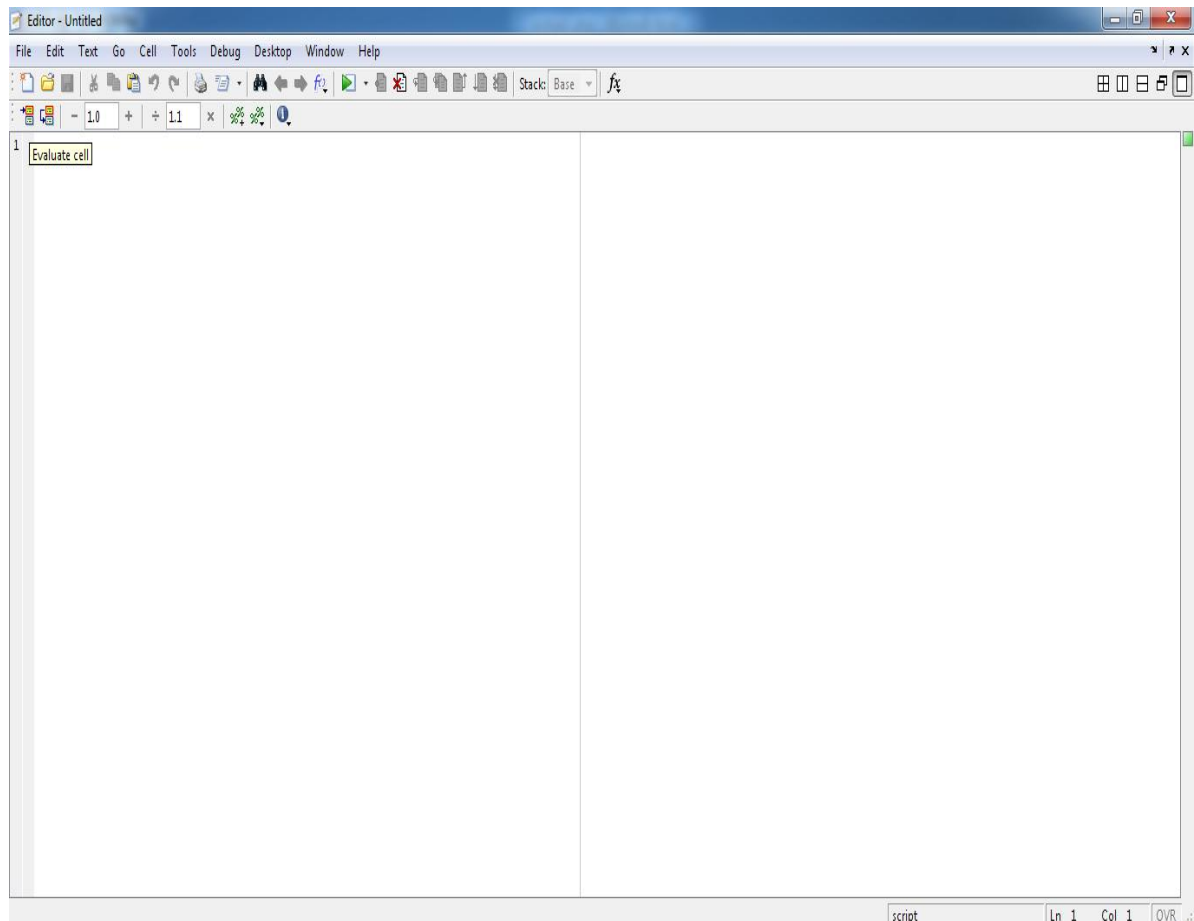
Στην πρώτη αποθηκεύονται οι μεταβλητές που έχουμε δημιουργήσει μέσω των εντολών καθώς και οι τιμές τους.

Στην δεύτερη περιοχή μπορούμε να δούμε τις εντολές που έχουν τρέξει μέχρι στιγμής.

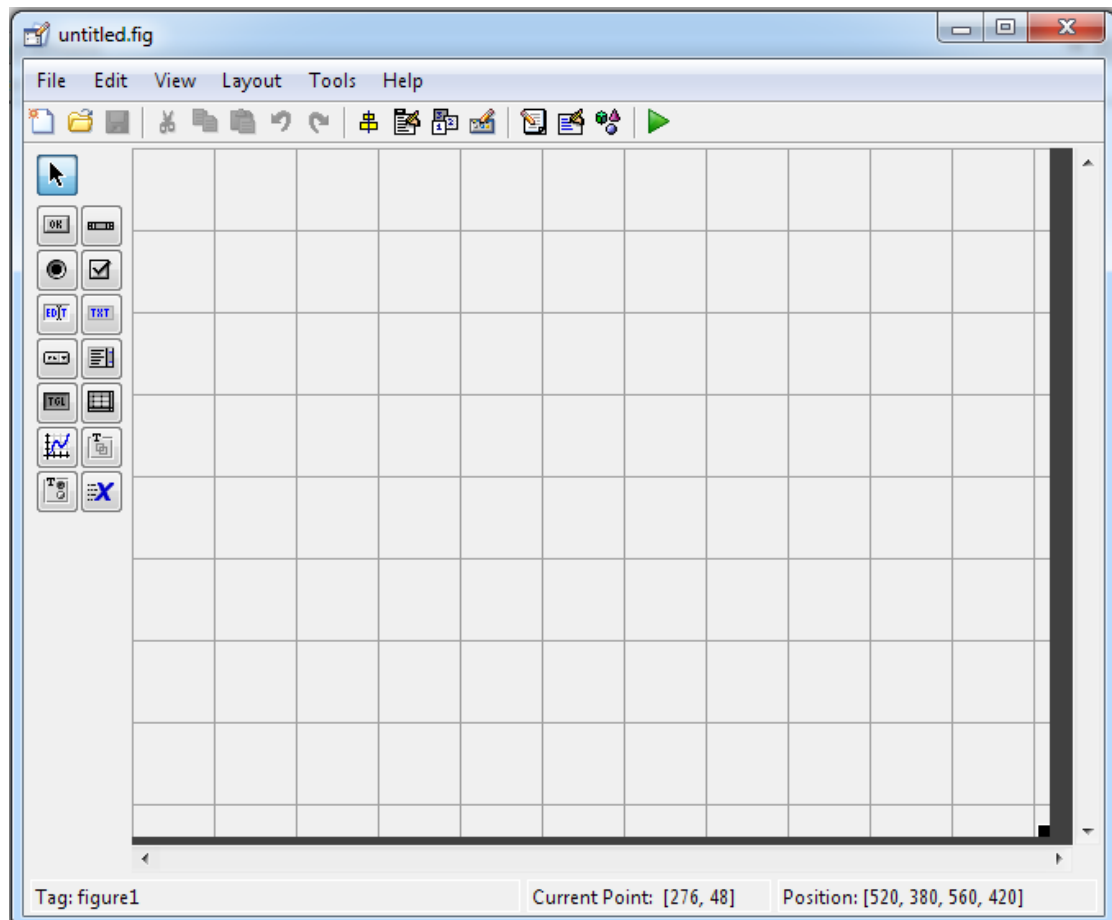
Τέλος στην μεσαία στήλη είναι το Command Window στο οποίο μπορούμε να δώσουμε τις εντολές μας. Τις εντολές τις δίνουμε είτε

απευθείας γράφοντάς τες είτε φτιάχνοντας ένα script αρχείο και τρέχοντάς το. Το αρχείο αυτό το αποθηκεύουμε με την μορφή .m .

Ένας άλλος τύπος αρχείου που έχει χρησιμοποιηθεί στην πτυχιακή είναι ο .fig. Ο τύπος αυτός χρησιμοποιήθηκε για να κατασκευαστεί η γραφική αναπαράσταση (GUI) των φαινομένων, μιας και το αρχείο αυτό αναφέρεται στο περιβάλλον μέσα από το οποίο απεικονίζονται τα φαινόμενα. Στο Σχήμα 2.2 βλέπουμε τον συντάκτη για τα αρχεία τύπου .m Σχήμα 2.3 βλέπουμε τον συντάκτη για τα αρχεία .fig.



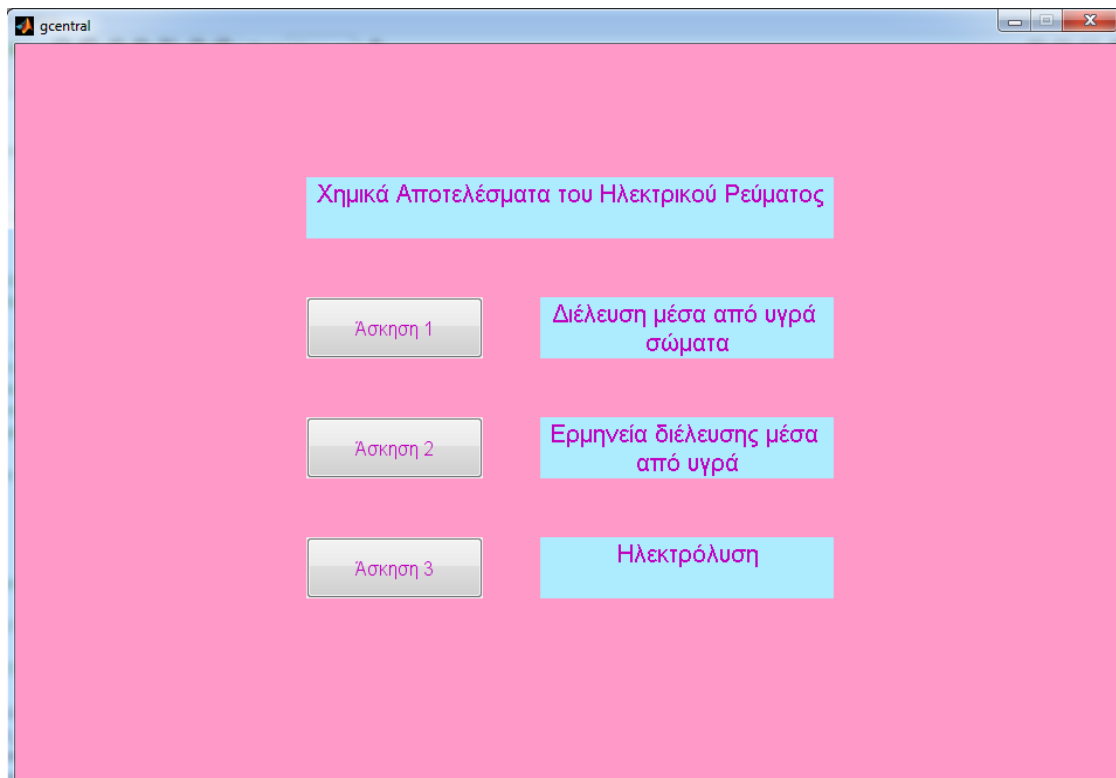
Σχήμα . Συντάκτης αρχείων Matlab



Σχήμα . Συντάκτης GUI

2.2 Κεντρικό παράθυρο εφαρμογής

Για να τρέξει ο κώδικας της πτυχιακής αρκεί να γίνει εκτέλεση του αρχείου gcentral.m. Το αποτέλεσμα είναι το παράθυρο του σχήματος 2.4.



Σχήμα . Κεντρικό παράθυρο εφαρμογής

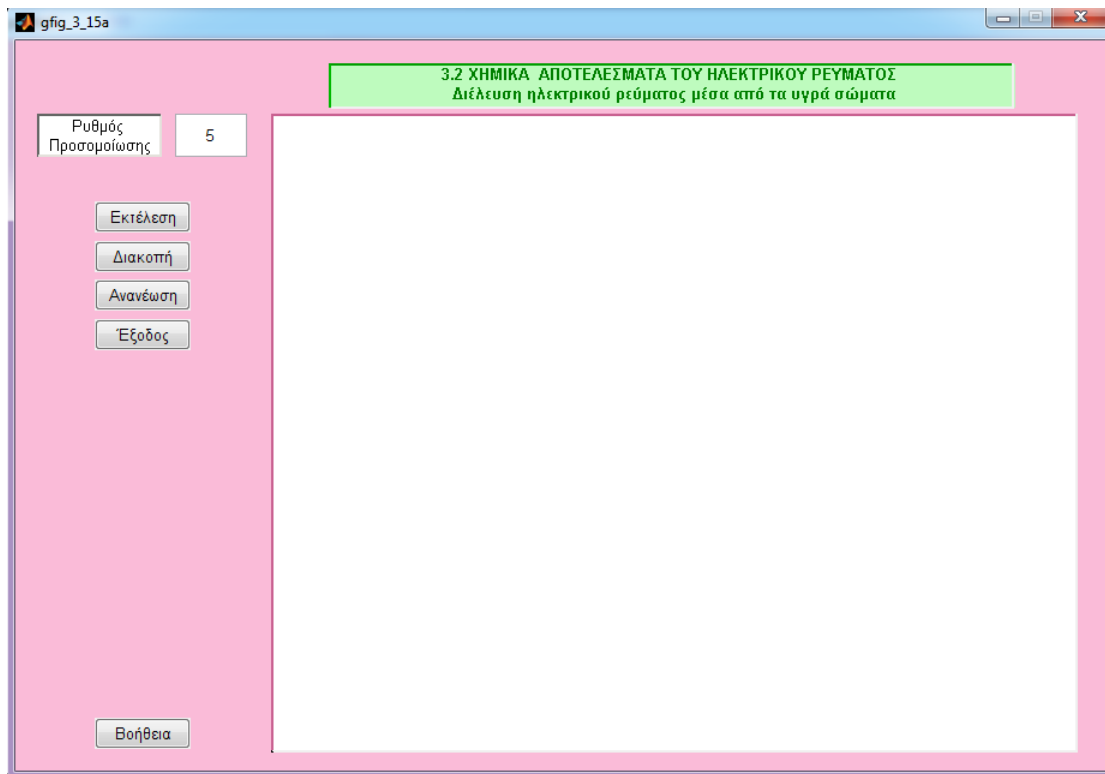
Το παράθυρο αυτό είναι ένα GUI παράθυρο (.fig αρχείο) το οποίο αποτελείται από τέσσερα text boxes και από τρία κουμπιά. Αφού κατασκευάστηκε ο παράθυρο, αποθηκεύτηκε με όνομα gcentral.fig.

Στην συνέχεια όπως υπάρχει σε επόμενο κεφάλαιο, θα παρατηρηθεί ότι το όνομα του αρχείου αυτού καλείται από ένα Matlab (.m) αρχείο για να αξιοποιηθούν τα περιεχόμενά του.

Κλειδιά σημεία του αρχείου αυτού είναι τα ονόματα που έχουν το κάθε κουμπί έτσι ώστε να κλιθούν από το προηγούμενο αρχείο.

2.3 Το παράθυρο της “Άσκηση 1”

Αφού έχει τρέξει το αρχείο της παραγράφου 2.2, αν ο χρήστης πατήσει στο κουμπί Άσκηση 1, τότε φορτώνεται το δεύτερο GUI παράθυρο το οποίο φαίνεται στο σχήμα 2.5.

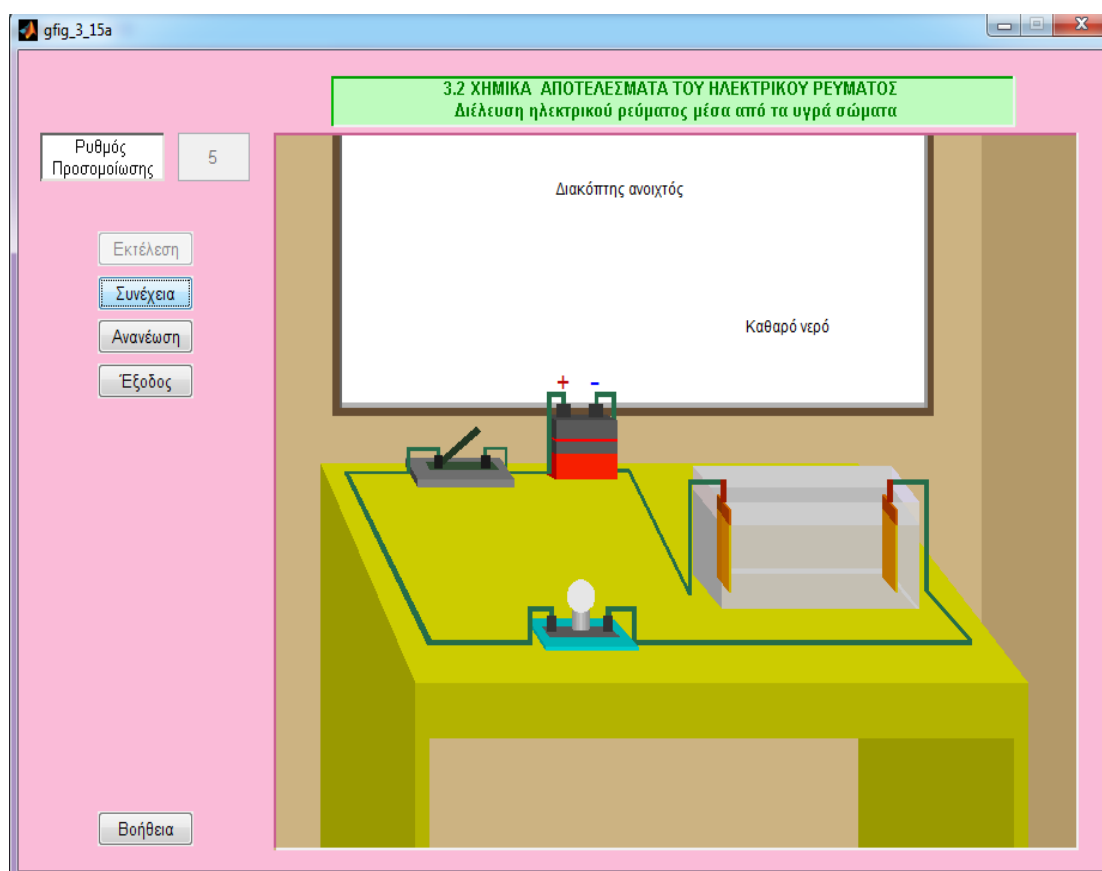


Σχήμα . Παράθυρο GUI για την Άσκηση 1

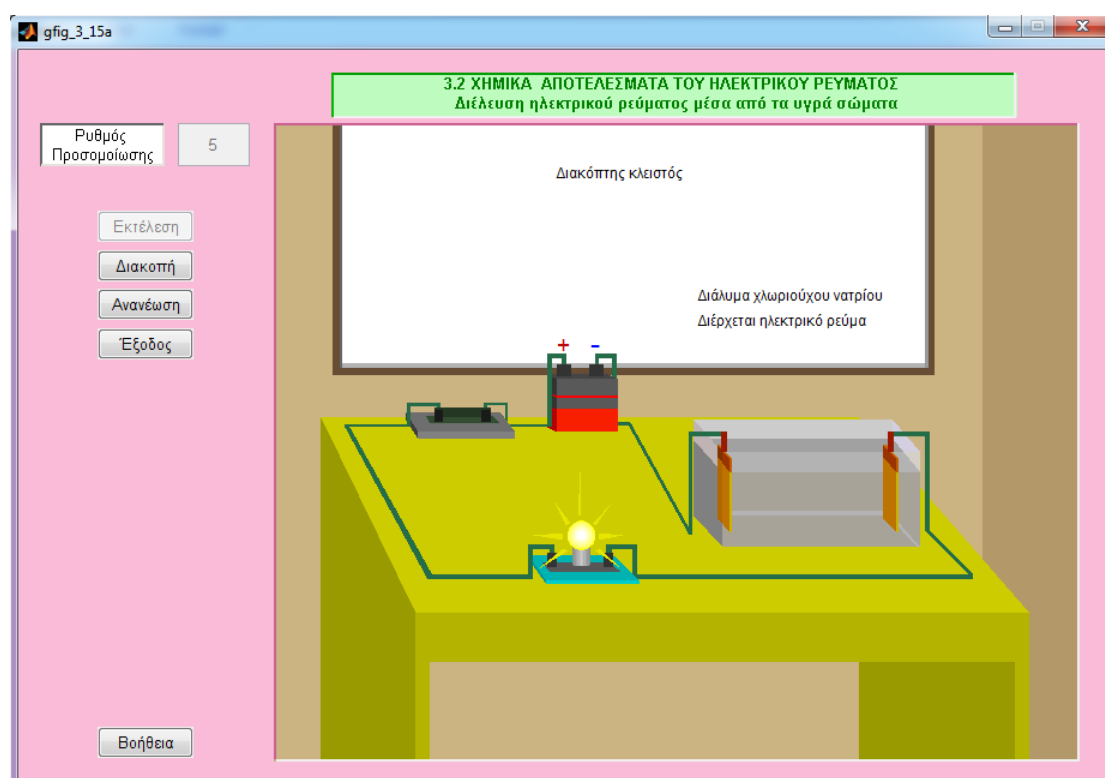
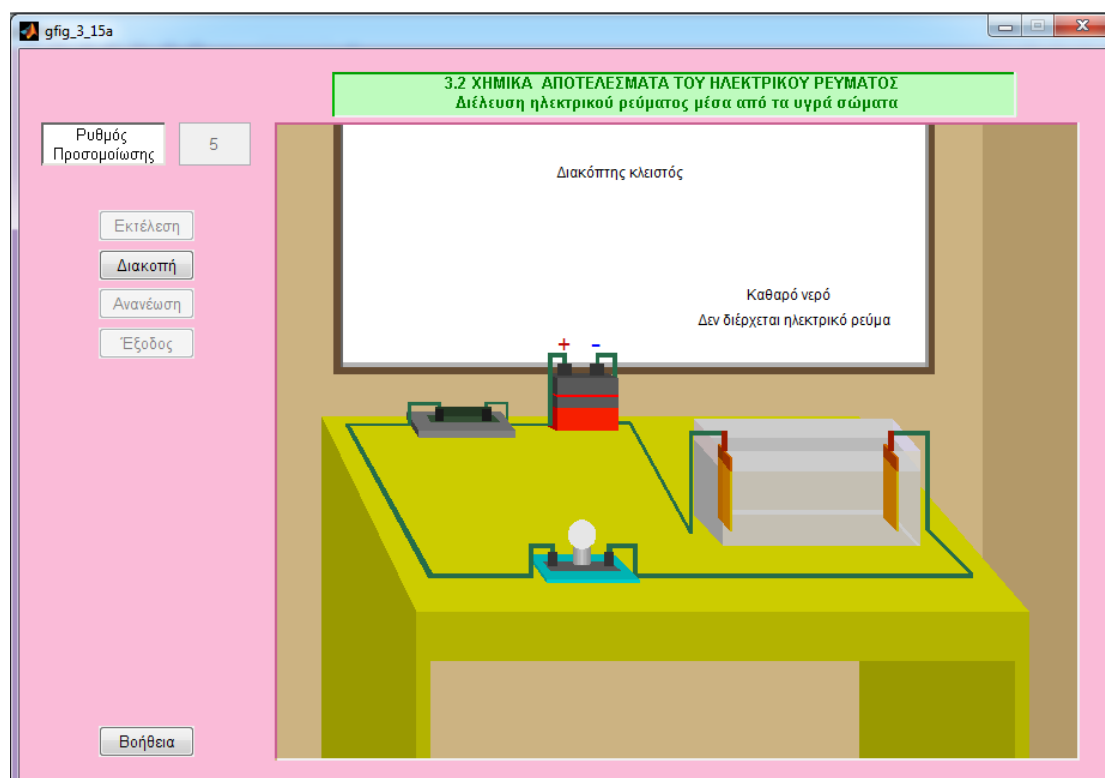
Το παράθυρο αυτό αποτελείται από ένα κουτάκι στο οποίο γράφεται ο ρυθμός με τον οποίο τρέχει το παράδειγμα και πέντε κουμπιά τα οποία κάνουν τις εξής διεργασίες:

- Εκτέλεση του παραδείγματος (Εκτέλεση)
- Διακοπή του παραδείγματος (Διακοπή)
- Επαναφορά του παραδείγματος στην αρχική κατάσταση (Ανανέωση)
- Έξοδος από το παράδειγμα (Έξοδος)
- Βοήθεια για το παράδειγμα (Βοήθεια)

Μόλις ο χρήστης πατήσει το κουμπί έναρξη τότε το παράδειγμα αρχίζει και εμφανίζεται στο σημείο των αξόνων (το λευκό κομμάτι στο σχήμα 2.5) η εικόνα του σχήματος 2.6.



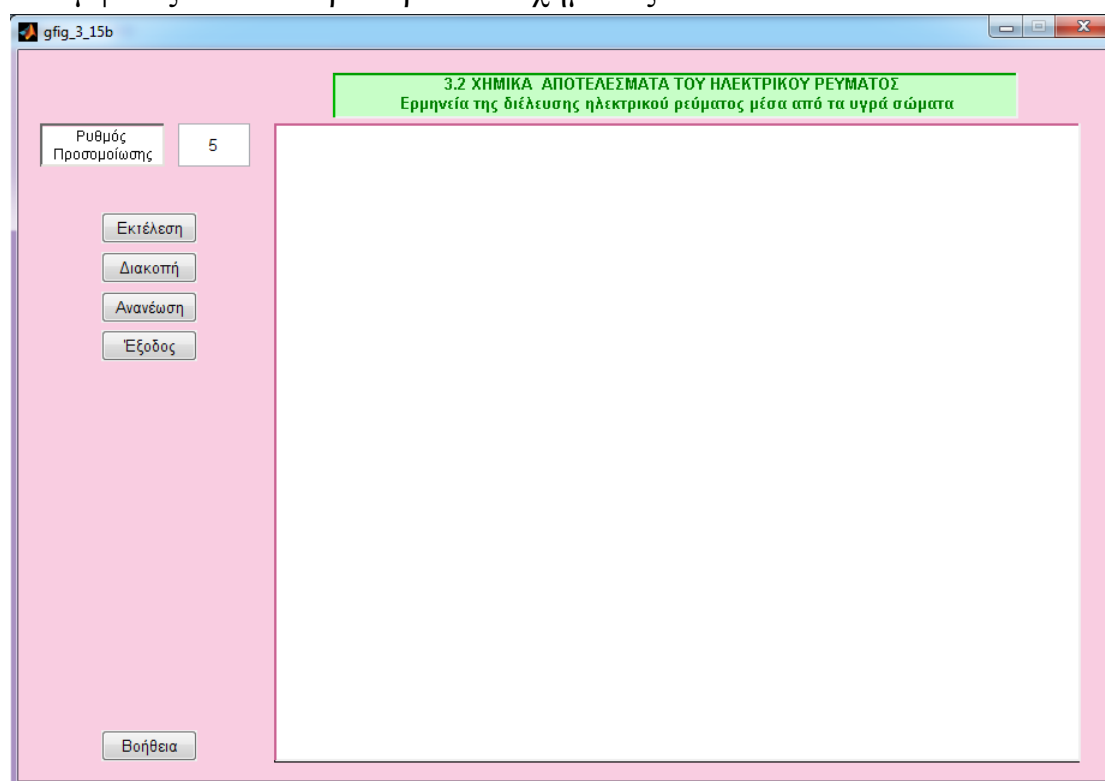
Γίνεται η γραφική αναπαράσταση του ηλεκτρικού κυκλώματος όπου είναι συνδεδεμένοι μια μπαταρία, ένας δικόπτης, ένα λαμπάκι και ένα δοχείο γεμάτο με καθαρό νερό. Στο τέλος της εκτέλεσης του παραδείγματος εμφανίζεται στο λευκό παράθυρο πίσω από το κύκλωμα η εξήγηση του φαινομένου όπως φαίνονται στα παρακάτω σχήματα.



Σχήμα . Τέλος εκτέλεσης του πρώτου παραδείγματος

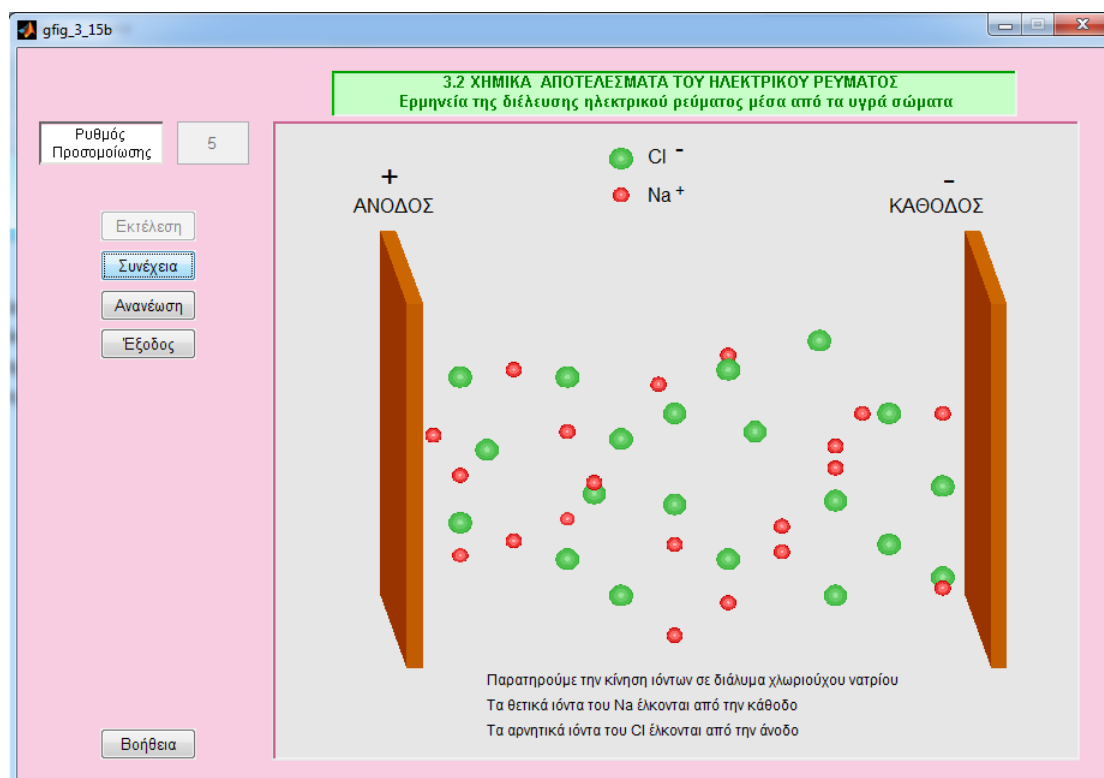
2.4 Το παράθυρο της “Άσκηση 2”

Το παράθυρο της άσκησης δύο ακολουθεί την ίδια λογική με το παράθυρο της άσκησης ένα. Κατά την εκτέλεση του παραδείγματος εμφανίζεται το παράθυρο του σχήματος 2.8.



Σχήμα . Παράθυρο GUI για την Άσκηση 2

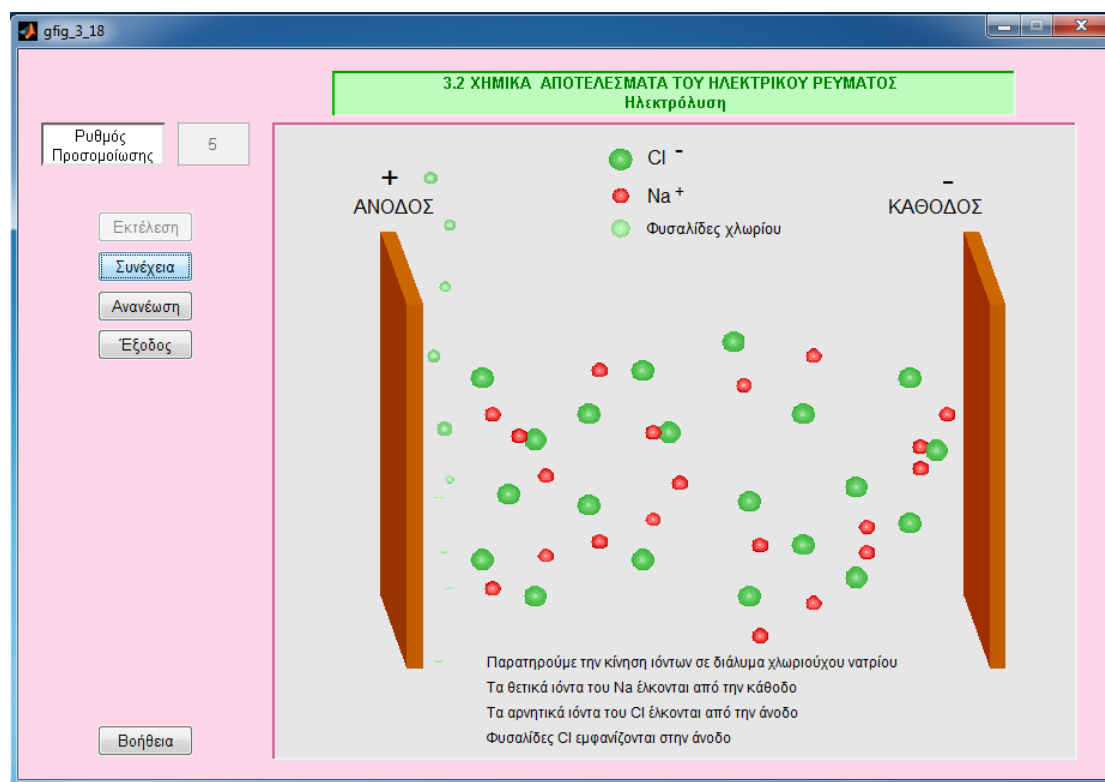
Πατώντας στο κουμπί εκτέλεση παρατηρούμε την κίνηση ιόντων σε διάλυμα χλωριούχου νατρίου. Γενικά μέσα σε ένα διάλυμα με ιόντα, τα ιόντα έχουν ηλεκτρικό φορτίο ενώ μπορούν να κινηθούν ελεύθερα μέσα στο υγρό. Εφαρμόζοντας διαφορά δυναμικού στο υγρό τα ανιόντα κινούνται προς την άνοδο και τα κατιόντα προς την κάθοδο προσδιορίζοντας το ηλεκτρικό τους φορτίο στους ακροδέκτες. Η ροή ηλεκτρικού ρεύματος σχετίζεται άμεσα σε χημικές αντιδράσεις που συμβαίνουν ταυτόχρονα μέσα στο διάλυμα. (Σχήμα 2.9).



Σχήμα . Εκτέλεση του παραδείγματος 2

2.5 Το παράθυρο της “Άσκηση 3”

Όμοια με πριν το παράθυρο του παραδείγματος αυτού ακολουθεί την ίδια λογική. Η διαφορά είναι ότι εμφανίζονται φυσαλίδες στο πείραμα έτσι έχουμε το φαινόμενο της ηλεκτρόλυσης. Ηλεκτρόλυση είναι το φαινόμενο που συμβαίνει ταυτόχρονα με τη διέλευση του ηλεκτρικού ρεύματος απο το διάλυμα του χλωριούχου νατρίου. Έτσι οι φυσαλίδες αερίου εμφανίζονται στο αρνητικό ηλεκτρόδιο ενώ το διάλυμα κοντά στο θετικό ηλεκτόδιο θολώνει. Αυτό συμβαίνει γιατί στην περιοχή των ηλεκτροδίων σχηματίζονται διάφορες χημικές ενώσεις στις οποίες αποθηκεύεται χημική ενέργεια. Η ενέργεια αυτή προήλθε απο την ηλεκτρική ενέργεια του ηλεκτρικού ρεύματος που δημιουργήθηκε.



Σχήμα . Παράθυρο GUI για την Άσκηση 3

Κεφάλαιο 3

- Κώδικας εφαρμογής

Παρακάτω είναι ολόκληρος ο κώδικας εφαρμογής για την ανάπτυξη εκπαιδευτικού πακέτου ασκήσεων στο Matlab.

- ***gcentral.m***

```

function varargout = gcentral(varargin)
% GCENTRAL M-file for gcentral.fig
%     GCENTRAL, by itself, creates a new GCENTRAL or raises
the existing
%     singleton*.
%
%     H = GCENTRAL returns the handle to a new GCENTRAL or the
handle to
%     the existing singleton*.
%
%     GCENTRAL('CALLBACK',hObject,eventData,handles,...) calls
the local
%     function named CALLBACK in GCENTRAL.M with the given
input arguments.
%
%     GCENTRAL('Property','Value',...) creates a new GCENTRAL
or raises the
%     existing singleton*. Starting from the left, property
value pairs are
%     applied to the GUI before gcentral_OpeningFcn gets
called. An
%     unrecognized property name or invalid value makes
property application
%     stop. All inputs are passed to gcentral_OpeningFcn via
varargin.
%
%     *See GUI Options on GUIDE's Tools menu. Choose "GUI
allows only one
%     instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help gcentral

% Last Modified by GUIDE v2.5 01-Mar-2017 05:49:36

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                  'gui_Singleton',  gui_Singleton, ...
                  'gui_OpeningFcn', @gcentral_OpeningFcn, ...
                  'gui_OutputFcn',  @gcentral_OutputFcn, ...
                  'gui_LayoutFcn',   [] , ...
                  'gui_Callback',    []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State,
varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT

```

```
% --- Executes just before gcentral is made visible.
function gcentral_OpeningFcn(hObject, eventdata, handles,
varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to gcentral (see VARARGIN)

% Choose default command line output for gcentral
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes gcentral wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command
line.
function varargout = gcentral_OutputFcn(hObject, eventdata,
handles)
% varargout  cell array for returning output args (see
VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
gfig_3_15a;

% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
gfig_3_15b;

% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton3 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
gfig_3_18;
```

- **Gfig_3_15a.m**

```
function varargout = gfig_3_15a(varargin)
% GFIG_3_15A M-file for gfig_3_15a.fig
%   GFIG_3_15A, by itself, creates a new GFIG_3_15A or
%   raises the existing
%   singleton*.
%
%   H = GFIG_3_15A returns the handle to a new GFIG_3_15A or
%   the handle to
%   the existing singleton*.
%
%   GFIG_3_15A('CALLBACK',hObject,eventData,handles,...)
%   calls the local
%   function named CALLBACK in GFIG_3_15A.M with the given
%   input arguments.
%
%   GFIG_3_15A('Property','Value',...) creates a new
%   GFIG_3_15A or raises the
%   existing singleton*. Starting from the left, property
%   value pairs are
%   applied to the GUI before gfig_3_15a_OpeningFcn gets
%   called. An
%   unrecognized property name or invalid value makes
%   property application
%   stop. All inputs are passed to gfig_3_15a_OpeningFcn
%   via varargin.
%
%   *See GUI Options on GUIDE's Tools menu. Choose "GUI
%   allows only one
%   instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help gfig_3_15a

% Last Modified by GUIDE v2.5 28-Oct-2011 11:24:01

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                  'gui_Singleton',  gui_Singleton, ...
                  'gui_OpeningFcn', @gfig_3_15a_OpeningFcn,
                  ...
                  'gui_OutputFcn',  @gfig_3_15a_OutputFcn, ...
                  'gui_LayoutFcn',  [] , ...
                  'gui_Callback',   []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State,
varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
```



```
end
% End initialization code - DO NOT EDIT

% --- Executes just before gfig_3_15a is made visible.
function gfig_3_15a_OpeningFcn(hObject, eventdata, handles,
varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to gfig_3_15a (see
VARARGIN)

% Choose default command line output for gfig_3_15a
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes gfig_3_15a wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command
line.
function varargout = gfig_3_15a_OutputFcn(hObject, eventdata,
handles)
% varargout  cell array for returning output args (see
VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

function edit1_Callback(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit1 as
text
%          str2double(get(hObject,'String')) returns contents of
edit1 as a double

% --- Executes during object creation, after setting all
properties.
function edit1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
```

```

% handles    empty - handles not created until after all
CreateFcns called

% Hint: edit controls usually have a white background on
Windows.
%          See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in pushbutton1.
% function pushbutton1_Callback(hObject, eventdata, handles)
% % hObject    handle to pushbutton1 (see GCBO)
% % eventdata  reserved - to be defined in a future version of
MATLAB
% % handles    structure with handles and user data (see
GUIDATA)
% global ryt;
% ryt=str2double(get(handles.edit1,'String'));

% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
global ryt;
ryt=str2double(get(handles.edit1,'String'));

global status;
global stam;
global suv;
axes(handles.axes1)
axis off;
set(handles.pushbutton3,'string','Διακοπή')

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
stam=0;
suv=0;
status=0;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
set(handles.edit1,'enable','off');
set(handles.pushbutton2,'enable','off')
set(handles.pushbutton5,'enable','off')
set(handles.pushbutton6,'enable','off')

if ryt <0.001|ryt > 5
    hfin=warndlg('Βάλτε στο Ρυθμό Προσομοίωσης τιμή μεταξύ
0.001 και 5');
    return
else
end

ryte = -ryt+5+0.001;

```

```
% ΕΙΣΩΣΕΙΣ ΔΩΜΑΤΙΟΥ
xdd = [-0.1 1 0.75 -0.1];
ydd = [0 0 0.3 0.3];
xdp1 = [1 1 0.75 0.75];
ydp1 = [0 1 1 0.3];
xdv = [-0.1 0.75 0.75 0-0.1];
ydv = [0.3 0.3 1 1];

% ΕΙΣΩΣΕΙΣ ΤΡΑΠΕΖΙΟΥ

tr1x = [0.15 0.8 0.8 0.15];
tr1y = [0.39 0.39 0.4 0.4];
tr2x = [0.15 0.8 0.62 0.05];
tr2y = [0.4 0.4 0.44 0.44];
tr3x = [0.05 0.15 0.15 0.05];
tr3y = [0.25 0.15 0.4 0.44];
tr4x = [0.785 0.8 0.8 0.785];
tr4y = [0.15 0.15 0.4 0.4];
tr5x = [0.1 0.115 0.115 0.1]+0.05;
tr5y = [0.15 0.15 0.4 0.4];
tr6x = [0.785 0.785 0.62 0.62];
tr6y = [0.15 0.4 0.44 0.25];

% ΒΑΤΑΡΙΑ

met=0.18;
met1 =0.358;
met2 =0.0;
batx1 = [0.3 0.365 0.365 0.3]+met2;
baty1 = [0.44 0.44 0.5 0.5]*met+met1;
batx1b = [0.3 0.365 0.365 0.3]+met2;
baty1b = [0.465 0.465 0.5 0.5]*met+met1;
batx1bb = [0.3 0.365 0.365 0.3]+met2;
baty1bb = [0.478 0.478 0.48 0.48]*met+met1;
batx2 = [0.29 0.3 0.3 0.29]+met2;
baty2 = [0.445 0.44 0.5 0.505]*met+met1;

batx2b = [0.29 0.3 0.3 0.29]+met2;
baty2b = [0.47 0.465 0.5 0.505]*met+met1;
batx2bb = [0.29 0.3 0.3 0.29]+met2;
baty2bb = [0.484 0.478 0.48 0.486]*met+met1;
batx3 = [0.29 0.3 0.365 0.355]+met2;
baty3 = [0.505 0.5 0.5 0.505]*met+met1;

% poloi batarias
batpolx1 = [0.30 0.315 0.315 0.30]+met2;
batpoly1 = [0.502 0.502 0.515 0.515]*met+met1;

batpolx2 =batpolx1+0.034;
batpoly2 =batpoly1;

metdy =0.002;

diakddLamprx1 = [0.1530 0.2560 0.2560 0.1530];
diakddLampry1 = [0.4335 0.4335 0.4350 0.4350]+metdy;

diakddLamprx2 = [0.153 0.153 0.14 0.14];
diakddLampry2 = [0.4335 0.4350 0.439 0.4375]+metdy;
```

```

    diakddLamprx3= [0.1530    0.256    0.24    0.14];
    diakddLampry3 =[0.435    0.435    0.4390    0.439]+metdy;

    vasdiakx = [0.165  0.24  0.233    0.162];
    vasdiaky = [0.4378    0.4378    0.4392    0.4392]+0.001;

    poldiakx =[0.17    0.18    0.18  0.17];
    poldiaky =[0.4375  0.4375    0.44    0.44]-0.0005+metdy;

    dpoldiakx =poldiakx+0.05;
    dpoldiaky =poldiaky;

    moxlx =[0.17    0.175    0.22    0.215];
    moxly =[0.438    0.437    0.444    0.445]+metdy;

% KALODIA

%Lampthra -Lampthra
metk =-0.001;

ka3x =[0.143  0.255  0.255  0.143]+0.02;
ka3y =[0.406  0.406  0.407  0.407]+metk+0.002;

ka3xb =[0.143  0.51  0.51  0.143]+0.23;
ka3yb =[0.406  0.406  0.407  0.407]+metk+0.002;

%aristero megalos
ka5x =[0.170  0.163  0.075  0.08];
ka5y =[0.407  0.407  0.438  0.438];

% deksia epano pros bataria
ka6x =[0.39  0.409  0.408  0.39]-0.03;
ka6y =[0.4383  0.4383  0.439  0.439];

% aristera epano pros diakopth
ka7x =[0.075  0.15  0.15  0.075];
ka7y =[0.438  0.438  0.4385  0.4385];

% diakopth bataria
ka8x =[0.25  0.294  0.294  0.25];
ka8y =[0.438  0.438  0.4385  0.4385];

% bataria aristero
ka9x =[0.32  0.325  0.325  0.32]-0.03;
ka9y =[0.438  0.438  0.453  0.453];

% bataria deksia
ka10x =[0.395  0.4  0.4  0.395]-0.006-0.03;
ka10y =[0.4385  0.4385  0.453  0.453];

% bataria epanw aristera- mikro tmhma
ka11x =[0.32  0.34  0.34  0.32]-0.03;
ka11y =[0.452  0.452  0.453  0.453];

% bataria epanw aristera- mikro tmhma

```

```

ka12x =[0.335    0.34    0.34    0.335]-0.03;
ka12y =[0.45    0.45    0.453    0.453];

% bataria epanw deksia- mikro tmhma
ka13x =[0.39    0.37    0.37    0.39]-0.03;
ka13y =[0.453    0.453    0.452    0.452];

% bataria epanw deksia- mikro tmhma
ka14x =[0.37    0.375    0.375    0.37]-0.03;
ka14y =[0.45    0.45    0.453    0.453];

%akrodektis arist mikro
ka15x =[0.141    0.145    0.145    0.141];
ka15y =[0.438    0.438    0.443    0.443];
ka16x =[0.141    0.177    0.177    0.141];
ka16y =[0.4423    0.4423    0.443    0.443];
ka17x =[0.173    0.177    0.177    0.173];
ka17y =[0.441    0.441    0.443    0.443];
ka18x =[0.248    0.248    0.245    0.245];
ka18y =[0.4385    0.443    0.443    0.4385];
ka19x =[0.245    0.223    0.223    0.245];
ka19y =[0.443    0.443    0.4425    0.4425 ];
ka20x =[0.223    0.223    0.227    0.227];
ka20y =[0.443    0.441    0.441    0.443 ];

% HLEKTRODIA
ka45x =[0.4820    0.469    0.469    0.4820]+0.0005;
ka45y =[0.417    0.42    0.435    0.432]-0.0005;
ka45bx =[0.4820    0.485    0.485    0.482]+0.0005;
ka45by =[0.418    0.418    0.433    0.433]-0.0015;
ka45cx =[0.4820    0.485    0.4720    0.469]+0.0005;
ka45cy =[0.432    0.432    0.435    0.435    ]-0.0005;
ka45dx=[0.4750    0.4750    0.4695    0.47];
ka45dy =[0.4182    0.4332    0.4345    0.4194 ];
ka45fx=ka45bx;
ka45fy=[0.4165    0.4165    0.4288    0.4288];
ka45gx=ka45dx;
ka45gy =[0.4182    0.4306    0.4318    0.4194 ];
kka45x =ka45x+0.176;
kka45y=ka45y;
kka45bx =ka45bx+0.176;
kka45by =ka45by;
kka45cx =ka45cx+0.176;
kka45cy =ka45cy;
kka45dx=[0.6585    0.6455    0.6455    0.6585];
kka45dy =[0.4165    0.4195    0.432    0.4288];
kka45fx=ka45fx+0.176;
kka45fy=ka45fy;
ka45ex=kka45dx-0.176;
ka45ey=kka45dy;
ka46x =[0.488    0.494    0.494    0.488]-0.0140;
ka46y =[0.434    0.434    0.438    0.438]-0.001;
kka46x =ka46x+0.176;
kka46y=ka46y;
ka47x =[0.48    0.44    0.44    0.48 ];
ka47y =[0.438    0.438    0.437    0.437    ]-0.001;

% Kalodia voltometrou batarias

```

```

kk47x= [0.332 0.336 0.336 0.332];
kk47y= [0.4507 0.4507 0.463 0.463];
ka48x =[0.44 0.44 0.444 0.444 ];
ka48y =[0.437 0.416 0.416 0.437 ];
ka49x =[0.44 0.444 0.378 0.373];
ka49y =[0.416 0.416 0.439 0.439 ];
ka50x =[0.27 0.275 0.275 0.27];
ka50y =[0.407 0.407 0.414 0.414];
ka51x =[0.27 0.298 0.298 0.27];
ka51y =[0.413 0.413 0.414 0.414];
ka52x =[0.292 0.298 0.298 0.292];
ka52y =[0.414 0.414 0.4124 0.4124 ];
ka53x =ka51x+0.085;
ka53y =ka51y ;
ka54x =ka52x+0.06;
ka54y =ka52y ;
ka55x =ka50x+0.11;
ka55y =ka50y ;
ka56x=[0.74 0.735 0.69 0.695];
ka56y=[0.408 0.408 0.417 0.417];
ka57x=[ 0.69 0.695 0.695 0.69 ];
ka57y=[0.418 0.418 0.438 0.438]-0.001;
ka58x=[0.695 0.65 0.65 0.695];
ka58y=[0.438 0.438 0.437 0.437 ]-0.001;

% DOXEIO
dosx=1.5;
dosy=0.26;
doxmx=-0.095;
doxmy=0.277;

dox1 = ([0.38 0.52 0.52 0.38])*dosx+doxmx;
doy1 = ([0.525 0.525 0.6 0.6])*dosy+doxmy;
dox2 = ([0.36 0.38 0.38 0.36 ])*dosx+doxmx;
doy2 = ([0.55 0.525 0.6 0.6250 ])*dosy+doxmy;
dox3 = ([ 0.36 0.5 0.5 0.36 ])*dosx+doxmx;
doy3 = ([ 0.55 0.55 0.6250 0.6250])*dosy+doxmy;
dox4 = ([ 0.52 0.52 0.5 0.5 ])*dosx+doxmx;
doy4 = ([ 0.525 0.6 0.6250 0.55])*dosy+doxmy;
akmx1 = ([0.38 0.5 0.5 0.38])*dosx+doxmx;
akmy1 = ([0.55 0.55 0.553 0.553])*dosy+doxmy ;
akmx2 = ([0.497 0.5 0.5 0.497 ])*dosx+doxmx;
akmy2 = ([0.55 0.55 0.60 0.60 ])*dosy+doxmy ;
akmx3 = ([0.497 0.5 0.52 0.517 ])*dosx+doxmx;
akmy3 = ([0.55 0.55 0.525 0.525])*dosy+doxmy ;

% NERO
nex1 = ([0.38 0.52 0.52 0.38])*dosx+doxmx;
ney1 = ([0.525 0.525 0.584 0.584])*dosy+doxmy;
nex2 = ([0.36 0.38 0.38 0.36 ])*dosx+doxmx;
ney2 = ([0.55 0.525 0.584 0.6090])*dosy+doxmy;
nex3 = ([0.36 0.38 0.52 0.5 ])*dosx+doxmx;
ney3 = ([0.61 0.584 0.584 0.61])*dosy+doxmy;
nex4 = [0.6665 0.685 0.475 0.455];
ney4 = [0.433 0.4288 0.4288 0.433];

% LAMPTIRAS LAMPTIRAS LAMPTIRAS LAMPTIRAS
% LAMPTIRAS LAMPTIRAS LAMPTIRAS LAMPTIRAS

```

```

met7 =1;
met8 =0.15;
met9 =0.345;
met10=0.11;
met11=0.09;
mmt11=0.0054;
metlabx =-0.05;
metlaby =-0.003;
f2 = 0:pi/30:2*pi;
% Basi
% Lamprx1 = [0.2500    0.3500    0.3500    0.2500]+met11;
% Lampry1 = [0.4025    0.4025    0.4032    0.4032]+mmt11;

Lamprx1 = [0.338    0.338    0.438    0.438 ]+metlabx;
Lampry1 = [0.4096    0.4089    0.4089    0.4096]+metlaby;

Lamprx2 = [0.3200    0.338    0.338    0.3200]+metlabx;
Lampry2 = [0.4142    0.4089    0.4096    0.4149]+metlaby;

Lamprx3 = [0.3200    0.338    0.438    0.4100]+metlabx;
Lampry3 = [0.4149    0.4096    0.4096    0.4149]+metlaby;

% stoirigma kai labtiras
Labstx1 = [0.2760    0.2960    0.2960
0.2760]+met11+metlabx;
Labsty1 = [0.40738    0.40738    0.4110
0.4110]+mmt11+metlaby;

s1Labstx1 = [0.2780    0.2940    0.2940
0.2780]+met11+metlabx;
s1Labsty1 = [0.4072    0.4072    0.4110
0.4110]+mmt11+metlaby;

s2Labstx1 = [0.2800    0.2920    0.2920
0.2800]+met11+metlabx;
s2Labsty1 = [0.4072    0.4072    0.4110
0.4110]+mmt11+metlaby;

s3Labstx1 = [0.2820    0.2900    0.2900
0.2820]+met11+metlabx;
s3Labsty1 = [0.4072    0.4072    0.4110
0.4110]+mmt11+metlaby;

s4Labstx1 = [0.2840    0.2880    0.2880
0.2840]+met11+metlabx;
s4Labsty1 = [0.4072    0.4072    0.4110
0.4110]+mmt11+metlaby;

s5Labstx1 = [0.2850    0.2870    0.28700
0.2850]+met11+metlabx;
s5Labsty1 = [0.4072    0.4072    0.4110
0.4110]+mmt11+metlaby;

s6Labstx1 = [0.2855    0.2865    0.2865
0.2855]+met11+metlabx;
s6Labsty1 = [0.4072    0.4072    0.4110
0.4110]+mmt11+metlaby;

```

```

rlabx =0.015;
rlaby =0.02;

labx = (0.18+rlabx*cos(f2))*met7+met10-0.004+met11+metlabx;
laby = (0.47+rlaby*sin(f2))*met8+met9-0.002+mmt11+metlaby;

labx1 = (0.18+0.95*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby1 = (0.47+0.95*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx2 = (0.18+0.9*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby2 = (0.47+0.9*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx3 = (0.18+0.82*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby3 = (0.47+0.82*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx4 = (0.18+0.7*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby4 = (0.47+0.7*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx5 = (0.18+0.6*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby5 = (0.47+0.6*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx6 = (0.18+0.5*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby6 = (0.47+0.5*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx7 = (0.18+0.4*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby7 = (0.47+0.4*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx8 = (0.18+0.3*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby8 = (0.47+0.3*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

labx9 = (0.18+0.2*rlabx*cos(f2))*met7+met10-
0.004+met11+metlabx;
laby9 = (0.47+0.2*rlaby*sin(f2))*met8+met9-
0.002+mmt11+metlaby;

% Vasi hlektrodekti

hleqx =[0.2570    0.3330    0.320    0.2500]-
0.005+met11+metlabx;
hleky =[0.406    0.406    0.408    0.408]+mmt11+metlaby;

```



```

hlekxpolx1 = [0.2600    0.2700    0.2700    0.2600]-
0.01+metl1+metlabx;
hlekxpoly1 = [0.408    0.408    0.411    0.411]-
0.001+mmtl1+metlaby;

hlekxpolx2 = hlekxpolx1+0.06;
hlekxpoly2 =hlekxpoly1;

xpin1 = [0.1    0.7+0.02    0.7+0.02    0.1]-0.03;
ypin1 = [0.45    0.45    0.95    0.95 ];

xpin2 = [0.093    0.71+0.02    0.71+0.02    0.093]-0.03;
ypin2 = [0.4485    0.4485    0.96    0.96];

% %skiasi pinaka
pinsk_k_x = [0.1    0.7+0.02    0.7+0.02    0.1]-0.03;
pinsk_k_y = [0.45    0.45    0.451 0.451 ];

pinsk_a_x = [0.1    0.103    0.103    0.1]-0.03;
pinsk_a_y = [0.45    0.45    0.95    0.95 ];

pinsk_d_x = [0.1    0.103    0.103    0.1]+0.6+0.02-0.03 ;
pinsk_d_y = [0.45    0.45    0.95    0.95 ];

pinsk_p_x = [0.1    0.7+0.02    0.7+0.02    0.1]-0.03;
pinsk_p_y = [0.45    0.45    0.451 0.451 ]+0.299;

fill(xdd, ydd, [0.5,    ka3xb, ka3yb, [0.1451
0.5, 0.5] ,xdp1, ydp1,    0.4235 0.2863] ,...
[0.7 0.6 0.41 ], xdv,    ka5x, ka5y, [0.1451
ydv, [0.8 0.7 0.51] ,...    0.4235 0.2863] ,ka6x,
xpin2, ypin2 , [0.4 0.3,    ka6y, [0.1451 0.4235
0.2 ],...    0.2863] ,...
xpin1, ypin1 , [1 1 1
],...    ka7x, ka7y, [0.1451
0.4235 0.2863] , ka10x,
pinsk_k_x,pinsk_k_y,[0.7,    ka10y, [0.1451 0.4235
0.7,0.7] ,...    0.2863] ,...
pinsk_a_x,pinsk_a_y,[0.4,    ka11x, ka11y, [0.1451
0.4,0.4] ,...    0.4235 0.2863] , ka12x,
pinsk_d_x,pinsk_d_y,[0.6,    ka12y, [0.1451 0.4235
0.6,0.6] ,...    0.2863] ,...
pinsk_p_x,pinsk_p_y,[0.3,    ka13x, ka13y, [0.1451
0.3,0.3] ,...    0.4235 0.2863] ,...
tr6x, tr6y , [0.6 0.6,    ka14x, ka14y, [0.1451
0] ,...    0.4235 0.2863] ,...
tr1x, tr1y , [0.7 0.7,    ka18x, ka18y, [0.1451
0] ,...    0.4235 0.2863] ,...
tr2x, tr2y , [0.8 0.8,    ka19x, ka19y, [0.1451
0] ,...    0.4235 0.2863] ,...
tr3x, tr3y , [0.6, 0.6,    ka20x, ka20y, [0.1451
0] ,...    0.4235 0.2863] ,...
tr4x, tr4y , [0.7, 0.7,    batx1, baty1, [0.97 0.12
0] ,...    0] ,...
tr5x, tr5y , [0.7, 0.7,    batx1b, baty1b, [0.35
0] ,...    0.35 0.35] ,...
ka3x, ka3y, [0.1451    batx1bb, baty1bb, [1 0
0.4235 0.2863] ,...    0] ,...

```

```

batx2, baty2, [0.7 0
0],...
batx2b, baty2b, [0.2 0.2
0.2],...
batx2bb, baty2bb, [0.9 0
0],...
batx3, baty3, [0.27 0.27
0.27],...
batpolx1, batpoly1 , [0.2
0.2 0.2],...
batpolx2, batpoly2 , [0.2
0.2 0.2],...
ka8x, ka8y, [0.1451
0.4235 0.2863],...
ka9x, ka9y, [0.1451
0.4235 0.2863],...
ka17x, ka17y, [0.1451
0.4235 0.2863],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
diakddLamprx1,
diakddLampry1 , [0.5
0.5 0.5 ],...
diakddLamprx2,
diakddLampry2, [0.24
0.24 0.24 ],...
diakddLamprx3,
diakddLampry3, [0.43
0.43 0.43 ],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
moxlx, moxly, [0.1373
0.2157 0.1373],...
poldiakx, poldiaky, [0.1
0.1 0.1],...
dpoldiakx, dpoldiaky,
[0.1 0.1 0.1],...
ka15x, ka15y, [0.1451
0.4235 0.2863],...
ka16x, ka16y, [0.1451
0.4235 0.2863],...
dox4, doy4, [0.83 0.81
0.88],...
dox3, doy3, [0.8 0.8
0.8],...
nex3, ney3, [0.73 0.73
0.73],...
dox1, doy1, [0.83 0.81
0.78],...
nex1, ney1, [0.77 0.75
0.7],...
akmx1, akmy1, [0.8 0.8
0.8],...
akmx2, akmy2, [0.8 0.8
0.8],...
akmx3, akmy3, [0.8 0.8
0.8],...
ka48x, ka48y, [0.1451
0.4235 0.2863],...
ka49x, ka49y, [0.1451
0.4235 0.2863],...
ka55x, ka55y, [0.1451
0.4235 0.2863],...
Lamprx1, Lampry1, [0.
0.8 0.8 ],...
Lamprx2, Lampry2, [0.
0.6 0.6 ],...
Lamprx3, Lampry3, [0.
0.7 0.7],...
hleqx, hleky, [0.34 0.34
0.34],...
Labstx1, Labsty1 , [0.55
0.55 0.55 ],...
s1Labstx1, s1Labsty1 ,
[0.6 0.6 0.6 ],...
s2Labstx1, s2Labsty1 ,
[0.65 0.65 0.65 ],...
s3Labstx1, s3Labsty1 ,
[0.7 0.7 0.7 ],...
s4Labstx1, s4Labsty1 ,
[0.75 0.75 0.75 ],...
s5Labstx1, s5Labsty1 ,
[0.78 0.78 0.78 ],...
s6Labstx1, s6Labsty1 ,
[0.8 0.8 0.8 ],...
labx, laby, [0.9 0.9
0.9],...
hlekipolx1, hlekipoly1,
[0.2 0.2 0.2],...
hlekipolx2, hlekipoly2,
[0.2 0.2 0.2],...
ka50x, ka50y, [0.1451
0.4235 0.2863],...
ka51x, ka51y, [0.1451
0.4235 0.2863],...
ka52x, ka52y, [0.1451
0.4235 0.2863],...
ka53x, ka53y, [0.1451
0.4235 0.2863],...
ka54x, ka54y, [0.1451
0.4235 0.2863],...
ka56x, ka56y, [0.1451
0.4235 0.2863],...
ka57x, ka57y, [0.1451
0.4235 0.2863],...
ka58x, ka58y, [0.1451
0.4235 0.2863],...
nex4, ney4, [0.8 0.8
0.8],...
kka45x, kka45y, [0.6 0.2
0],...
kka45bx, kka45by, [0.76
0.36 0],...
kka45cx, kka45cy, [0.8
0.4 0],...
kka46x, kka46y, [0.6 0.1
0],...
ka45bx, ka45by, [0.76
0.36 0],...

```

```

ka45cx, ka45cy, [0.8 0.4
0],...
ka45x, ka45y, [0.6 0.2
0],...
dox2, doy2, [0.75 0.7
0.7],...
nex2, ney2, [0.6 0.6
0.6],...
ka47x, ka47y, [0.1451
0.4235 0.2863],...
ka45dx,ka45dy, [0.5 0.2
0],...,.
ka46x, ka46y, [0.6 0.1
0],...
kka45dx, kka45dy, [0.74
0.45 0],...
ka45ex, ka45ey, [0.74
0.45 0],...
kka45fx,kka45fy, [0.8 0.7
0],...
ka45fx,ka45fy, [0.8 0.7
0],...
ka45gx,ka45gy,[0.7 0.4
0],...
'LineStyle','none')

axis([0 0.85 0.37 0.5]);

text(0.3 , 0.49, 'Διακόπτης ανοιχτός', 'FontSize',9 )
text(0.30 , 0.455, '+', 'FontSize',14, 'Color', [0.7451 0.03137
0.03137] )
text(0.336, 0.455, '-', 'FontSize',18,'Color', 'b' )
text(0.5 , 0.45+0.015, 'Καθαρό νερό', 'FontSize',9 )
axis off

moxlx =[0.17 0.17 0.23 0.23];
moxly =[0.442 0.44 0.44 0.442];
%
pause(5)

fill(xdd, ydd, [0.5,
0.5, 0.5] ,xdp1, ydp1,
[0.7 0.6 0.41 ], xdv,
ydv,[0.8 0.7 0.51],...
xpin2, ypin2 , [0.4 0.3,
0.2 ],...
xpin1, ypin1 , [1 1 1
],...
pinsk_k_x,pinsk_k_y,[0.7,
0.7,0.7],...
pinsk_a_x,pinsk_a_y,[0.4,
0.4,0.4],...
pinsk_d_x,pinsk_d_y,[0.6,
0.6,0.6],...
pinsk_p_x,pinsk_p_y,[0.3,
0.3,0.3],...
tr6x, tr6y , [0.6 0.6,
0],...
tr1x, tr1y , [0.7 0.7,
0],...
tr2x, tr2y , [0.8 0.8,
0],...
tr3x, tr3y , [0.6, 0.6,
0],...
tr4x, tr4y , [0.7, 0.7,
0],...
tr5x, tr5y , [0.7, 0.7,
0],...
ka3x, ka3y, [0.1451
0.4235 0.2863] ,...
ka3xb, ka3yb, [0.1451
0.4235 0.2863] ,...
ka5x, ka5y, [0.1451
0.4235 0.2863] ,ka6x,
ka6y, [0.1451 0.4235
0.2863] ,...
ka7x, ka7y, [0.1451
0.4235 0.2863] , ka10x,
ka10y, [0.1451 0.4235
0.2863],...
ka11x, ka11y, [0.1451
0.4235 0.2863], ka12x,
ka12y, [0.1451 0.4235
0.2863],...
ka13x, ka13y, [0.1451
0.4235 0.2863],...
ka14x, ka14y, [0.1451
0.4235 0.2863],...
ka18x, ka18y, [0.1451
0.4235 0.2863],...
ka19x, ka19y, [0.1451
0.4235 0.2863],...
ka20x, ka20y, [0.1451
0.4235 0.2863],...
batx1, baty1, [0.97 0.12
0],...
batx1b, baty1b, [0.35
0.35 0.35],...
batx1bb, baty1bb, [1 0
0],...
batx2, baty2, [0.7 0
0],...
batx2b, baty2b, [0.2 0.2
0.2],...

```

```

batx2bb, baty2bb, [0.9 0
0],...
batx3, baty3, [0.27 0.27
0.27],...
batpolx1, batpoly1 , [0.2
0.2 0.2],...
batpolx2, batpoly2 , [0.2
0.2 0.2],...
ka8x, ka8y, [0.1451
0.4235 0.2863],...
ka9x, ka9y, [0.1451
0.4235 0.2863],...
ka17x, ka17y, [0.1451
0.4235 0.2863],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
diakddLamprx1,
diakddLampry1 , [0.5
0.5 0.5 ],...
diakddLamprx2,
diakddLampry2, [0.24
0.24 0.24 ],...
diakddLamprx3,
diakddLampry3, [0.43
0.43 0.43 ],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
moxlx, moxly, [0.1373
0.2157 0.1373],...
poldiakx, poldiaky, [0.1
0.1 0.1],...
dpoldiakx, dpoldiaky,
[0.1 0.1 0.1],...
ka15x, ka15y, [0.1451
0.4235 0.2863],...
ka16x, ka16y, [0.1451
0.4235 0.2863],...
dox4, doy4, [0.83 0.81
0.88],...
dox3, doy3, [0.8 0.8
0.8],...
nex3, ney3, [0.73 0.73
0.73],...
dox1, doy1, [0.83 0.81
0.78],...
nex1, ney1, [0.77 0.75
0.7],...
akmx1, akmy1, [0.8 0.8
0.8],...
akmx2, akmy2, [0.8 0.8
0.8],...
akmx3, akmy3, [0.8 0.8
0.8],...
ka48x, ka48y, [0.1451
0.4235 0.2863],...
ka49x, ka49y, [0.1451
0.4235 0.2863],...
ka55x, ka55y, [0.1451
0.4235 0.2863],...
Lamprx1, Lampry1, [0.
0.8 0.8 ],...
Lamprx2, Lampry2, [0.
0.6 0.6 ],...
Lamprx3, Lampry3, [0.
0.7 0.7],...
hlekkx, hlekky, [0.34 0.34
0.34],...
Labstx1, Labsty1 , [0.55
0.55 0.55 ],...
s1Labstx1, s1Labsty1 ,
[0.6 0.6 0.6 ],...
s2Labstx1, s2Labsty1 ,
[0.65 0.65 0.65 ],...
s3Labstx1, s3Labsty1 ,
[0.7 0.7 0.7 ],...
s4Labstx1, s4Labsty1 ,
[0.75 0.75 0.75 ],...
s5Labstx1, s5Labsty1 ,
[0.78 0.78 0.78 ],...
s6Labstx1, s6Labsty1 ,
[0.8 0.8 0.8 ],...
labx, laby, [0.9 0.9
0.9],...
hlekkpolx1, hlekkpoly1,
[0.2 0.2 0.2],...
hlekkpolx2, hlekkpoly2,
[0.2 0.2 0.2],...
ka50x, ka50y, [0.1451
0.4235 0.2863],...
ka51x, ka51y, [0.1451
0.4235 0.2863],...
ka52x, ka52y, [0.1451
0.4235 0.2863],...
ka53x, ka53y, [0.1451
0.4235 0.2863],...
ka54x, ka54y, [0.1451
0.4235 0.2863],...
ka56x, ka56y, [0.1451
0.4235 0.2863],...
ka57x, ka57y, [0.1451
0.4235 0.2863],...
ka58x, ka58y, [0.1451
0.4235 0.2863],...
nex4, ney4, [0.8 0.8
0.8],...
kka45x, kka45y, [0.6 0.2
0],...
kka45bx, kka45by, [0.76
0.36 0],...
kka45cx, kka45cy, [0.8
0.4 0],...
kka46x, kka46y, [0.6 0.1
0],...
ka45bx, ka45by, [0.76
0.36 0],...
ka45cx, ka45cy, [0.8 0.4
0],...
ka45x, ka45y, [0.6 0.2
0],...

```

```

dox2, doy2, [0.75 0.7
0.7],...
nex2, ney2, [0.6 0.6
0.6],...
ka47x, ka47y, [0.1451
0.4235 0.2863],...
ka45dx,ka45dy, [0.5 0.2
0],...
ka46x, ka46y, [0.6 0.1
0],...
kka45dx, kka45dy, [0.74
0.45 0],...
ka45ex, ka45ey, [0.74
0.45 0],...
kka45fx,kka45fy, [0.8 0.7
0],...
ka45fx,ka45fy, [0.8 0.7
0],...
ka45gx,ka45gy,[0.7 0.4
0],...
'LineStyle','none')

```

```
axis([0 0.85 0.37 0.5]);
```

```

text(0.3 , 0.49, 'Διακόπτης κλειστός', 'FontSize',9 )
text(0.30 , 0.455, '+', 'FontSize',14, 'Color', [0.7451 0.03137
0.03137] )
text(0.336, 0.455, '-', 'FontSize',18,'Color', 'b' )
text(0.5 , 0.45+0.015, 'Καθαρό νερό', 'FontSize',9 )
text(0.45 , 0.445+0.015, 'Δεν διέρχεται ηλεκτρικό ρεύμα',
'FontSize',9 )
axis off

```

```
pause(6)
```

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

```

if (stam==1)
    cc=stam;
    while (cc==1)
        cc=stam;
        pause(ryte);
        if (status==1)
            return
        end
    end
end
end

```

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

```

% DOXEIO
dosx=1.5;
dosy=0.26;
doxmx=-0.095;
doxmy=0.277;

```

```

dox1 = ([0.38 0.52 0.52 0.38])*dosx+doxmx;
doy1 = ([0.525 0.525 0.6 0.6])*dosy+doxmy;

```

```

dox2 = ([0.36 0.38 0.38 0.36 ])*dosx+doxmx;
doy2 = ([0.55 0.525 0.6 0.6250 ])*dosy+doxmy;

```

```

dox3 = ([ 0.36 0.5 0.5 0.36 ])*dosx+doxmx;

```

```

doy3 = ([ 0.55  0.55  0.6250  0.6250])*dosy+doxmy;

dox4 = ([ 0.52  0.52  0.5  0.5 ])*dosx+doxmx;
doy4 = ([ 0.525  0.6  0.6250  0.55])*dosy+doxmy;

akmx1 = ([0.38  0.5  0.5  0.38])*dosx+doxmx;
akmy1 = ([0.55  0.55  0.553  0.553])*dosy+doxmy ;

akmx2 = ([0.497  0.5  0.5  0.497 ])*dosx+doxmx;
akmy2 = ([0.55  0.55  0.60  0.60 ])*dosy+doxmy ;

akmx3 = ([0.497  0.5  0.52  0.517 ])*dosx+doxmx;
akmy3 = ([0.55  0.55  0.525  0.525])*dosy+doxmy ;

% NERO
nex1 = ([0.38  0.52  0.52  0.38])*dosx+doxmx;
ney1 = ([0.525  0.525  0.584  0.584])*dosy+doxmy;

nex2 = ([0.36  0.38  0.38  0.36 ])*dosx+doxmx;
ney2 = ([0.55  0.525  0.584  0.6090])*dosy+doxmy;

nex3 = ([0.36  0.38  0.52  0.5 ])*dosx+doxmx;
ney3 = ([0.61  0.584  0.584  0.61])*dosy+doxmy;

nex4 = [0.6665  0.685  0.475  0.455];
ney4 = [0.433  0.4288  0.4288  0.433];

%

% LAMPTIRAS LAMPTIRAS LAMPTIRAS LAMPTIRAS
% LAMPTIRAS LAMPTIRAS LAMPTIRAS LAMPTIRAS

met7 =1;
met8 =0.15;
met9 =0.345;
met10=0.11;
met11=0.09;
mmt11=0.0054;
metlabx =-0.05;
metlaby =-0.003;
f2 = 0:pi/30:2*pi;
% Basi
% Lamprx1 = [0.2500  0.3500  0.3500  0.2500]+met11;
% Lampry1 = [0.4025  0.4025  0.4032  0.4032]+mmt11;

Lamprx1 = [0.338  0.338  0.438  0.438 ]+metlabx;
Lampry1 = [0.4096  0.4089  0.4089  0.4096]+metlaby;

Lamprx2 = [0.3200  0.338  0.338  0.3200]+metlabx;
Lampry2 = [0.4142  0.4089  0.4096  0.4149]+metlaby;

Lamprx3 = [0.3200  0.338  0.438  0.4100]+metlabx;
Lampry3 = [0.4149  0.4096  0.4096  0.4149]+metlaby;

% stoirigma kai labtiras
Labstx1 = [0.2760  0.2960  0.2960  0.2760]+met11+metlabx;

```

```

Labstyl = [0.4074    0.4074    0.4110    0.4110]+mmt11+metlaby;

rlabx =0.015;
rlaby =0.02;

labx = (0.18+rlabx*cos(f2))*met7+met10-0.004+met11+metlabx;
laby = (0.47+rlaby*sin(f2))*met8+met9-0.002+mmt11+metlaby;

% Vasi hlektrodekti

hleqx =[0.2570    0.3330    0.320    0.2500]-
0.005+met11+metlabx;
hleky =[0.406    0.406    0.408    0.408]+mmt11+metlaby;
hlexxpolx1 = [0.2600    0.2700    0.2700    0.2600]-
0.01+met11+metlabx;
hlexxpoly1 = [0.408    0.408    0.411    0.411]-
0.001+mmt11+metlaby;
hlexxpolx2 = hlexxpolx1+0.06;
hlexxpoly2 =hlexxpoly1;
moxlx =[0.17    0.175    0.22    0.215];
moxly =[0.438    0.437    0.444    0.445]+metdy;

fill(xdd, ydd, [0.5,
0.5, 0.5] ,xdp1, ydp1,
[0.7 0.6 0.41 ], xdv,
ydv,[0.8 0.7 0.51],...
xpin2, ypin2 , [0.4 0.3,
0.2 ],...
xpin1, ypin1 , [1 1 1
],...
pinsk_k_x,pinsk_k_y,[0.7,
0.7,0.7],...
pinsk_a_x,pinsk_a_y,[0.4,
0.4,0.4],...
pinsk_d_x,pinsk_d_y,[0.6,
0.6,0.6],...
pinsk_p_x,pinsk_p_y,[0.3,
0.3,0.3],...
tr6x, tr6y , [0.6 0.6,
0],...
tr1x, tr1y , [0.7 0.7,
0],...
tr2x, tr2y , [0.8 0.8,
0],...
tr3x, tr3y , [0.6, 0.6,
0],...
tr4x, tr4y , [0.7, 0.7,
0],...
tr5x, tr5y , [0.7, 0.7,
0],...
ka3x, ka3y, [0.1451
0.4235 0.2863] ,...
ka3xb, ka3yb, [0.1451
0.4235 0.2863] ,...
ka5x, ka5y, [0.1451
0.4235 0.2863] ,ka6x,
ka6y, [0.1451 0.4235
0.2863] ,...
ka7x, ka7y, [0.1451
0.4235 0.2863] , ka10x,
ka10y, [0.1451 0.4235
0.2863],...
ka11x, ka11y, [0.1451
0.4235 0.2863], ka12x,
ka12y, [0.1451 0.4235
0.2863],...
ka13x, ka13y, [0.1451
0.4235 0.2863],...
ka14x, ka14y, [0.1451
0.4235 0.2863],...
ka18x, ka18y, [0.1451
0.4235 0.2863],...
ka19x, ka19y, [0.1451
0.4235 0.2863],...
ka20x, ka20y, [0.1451
0.4235 0.2863],...
batx1, baty1, [0.97 0.12
0],...
batx1b, baty1b, [0.35
0.35 0.35],...
batx1bb, baty1bb, [1 0
0],...
batx2, baty2, [0.7 0
0],...
batx2b, baty2b, [0.2 0.2
0.2],...
batx2bb, baty2bb, [0.9 0
0],...
batx3, baty3, [0.27 0.27
0.27],...
batpolx1, batpoly1 , [0.2
0.2 0.2],...
batpolx2, batpoly2 , [0.2
0.2 0.2],...

```

```

ka8x, ka8y, [0.1451
0.4235 0.2863],...
ka9x, ka9y, [0.1451
0.4235 0.2863],...
ka17x, ka17y, [0.1451
0.4235 0.2863],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
diakddLamprx1,
diakddLampry1 , [0.5
0.5 0.5 ],...
diakddLamprx2,
diakddLampry2, [0.24
0.24 0.24 ],...
diakddLamprx3,
diakddLampry3, [0.43
0.43 0.43 ],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
moxlx, moxly, [0.1373
0.2157 0.1373],...
poldiakx, poldiaky, [0.1
0.1 0.1],...
dpoldiakx, dpoldiaky,
[0.1 0.1 0.1],...
ka15x, ka15y, [0.1451
0.4235 0.2863],...
ka16x, ka16y, [0.1451
0.4235 0.2863],...
dox4, doy4, [0.83 0.81
0.88],...
dox3, doy3, [0.8 0.8
0.8],...
nex3, ney3, [0.63 0.63
0.63],...
dox1, doy1, [0.83 0.81
0.78],...
nex1, ney1, [0.66 0.64
0.6],...
akmx1, akmy1, [0.7 0.7
0.7],...
akmx2, akmy2, [0.7 0.7
0.7],...
akmx3, akmy3, [0.7 0.7
0.7],...
ka48x, ka48y, [0.1451
0.4235 0.2863],...
ka49x, ka49y, [0.1451
0.4235 0.2863],...
ka55x, ka55y, [0.1451
0.4235 0.2863],...
Lamprx1, Lampry1, [0.
0.8 0.8 ],...
Lamprx2, Lampry2, [0.
0.6 0.6 ],...
Lamprx3, Lampry3, [0.
0.7 0.7],...
hleqx, hleky, [0.34 0.34
0.34],...
Labstx1, Labsty1 , [0.55
0.55 0.55 ],...
s1Labstx1, s1Labsty1 ,
[0.6 0.6 0.6 ],...
s2Labstx1, s2Labsty1 ,
[0.65 0.65 0.65 ],...
s3Labstx1, s3Labsty1 ,
[0.7 0.7 0.7 ],...
s4Labstx1, s4Labsty1 ,
[0.75 0.75 0.75 ],...
s5Labstx1, s5Labsty1 ,
[0.78 0.78 0.78 ],...
s6Labstx1, s6Labsty1 ,
[0.8 0.8 0.8 ],...
labx, laby, [1 1
1],...
hleixpolx1, hleixpoly1,
[0.2 0.2 0.2],...
hleixpolx2, hleixpoly2,
[0.2 0.2 0.2],...
ka50x, ka50y, [0.1451
0.4235 0.2863],...
ka51x, ka51y, [0.1451
0.4235 0.2863],...
ka52x, ka52y, [0.1451
0.4235 0.2863],...
ka53x, ka53y, [0.1451
0.4235 0.2863],...
ka54x, ka54y, [0.1451
0.4235 0.2863],...
ka56x, ka56y, [0.1451
0.4235 0.2863],...
ka57x, ka57y, [0.1451
0.4235 0.2863],...
ka58x, ka58y, [0.1451
0.4235 0.2863],...
nex4, ney4, [0.7 0.7
0.7],...
kka45x, kka45y, [0.6 0.2
0],...
kka45bx, kka45by, [0.76
0.36 0],...
kka45cx, kka45cy, [0.8
0.4 0],...
kka46x, kka46y, [0.6 0.1
0],...
ka45bx, ka45by, [0.76
0.36 0],...
ka45cx, ka45cy, [0.8 0.4
0],...
ka45x, ka45y, [0.6 0.2
0],...
dox2, doy2, [0.75 0.7
0.7],...
nex2, ney2, [0.5 0.5
0.5],...
ka47x, ka47y, [0.1451
0.4235 0.2863],...
ka45dx, ka45dy, [0.5 0.2
0],...

```



```

ka46x, ka46y, [0.6 0.1
0],...
kka45dx, kka45dy, [0.74
0.45 0],...
ka45ex, ka45ey, [0.74
0.45 0],...
kka45fx,kka45fy, [0.8 0.7
0],...
ka45fx,ka45fy, [0.8 0.7
0],...
ka45gx,ka45gy,[0.7 0.4
0],...
'LineStyle','none')

axis([0 0.85 0.37 0.5]);

text(0.3 , 0.49, 'Διακόπτης ανοιχτός', 'FontSize',9 )
text(0.30 , 0.455, '+', 'FontSize',14, 'Color', [0.7451 0.03137
0.03137] )
text(0.336, 0.455, '-', 'FontSize',18,'Color', 'b' )

text(0.45 , 0.45+0.015, 'Διάλυμα χλωριούχου νατρίου',
'FontSize',9 )

axis off

moxlx =[0.17 0.17 0.23 0.23];
moxly =[0.442 0.44 0.44 0.442];
%
pause(5)
% %

metatopisix2 =-0.05;
metatopisiy2 =-0.003;
B1xmin =0.382;
B1xmax=0.382;
B1x = B1xmax;
B1ymin=0.423;
B1ymax=0.432;
B1y= B1ymax;
A1x =0.38;
A1y=0.423;
C1x=0.384;
C1y=0.423;
aktx1 = [A1x B1x C1x]-0.0084+metatopisix2 ;
akty1 = [A1y B1y C1y]+metatopisiy2;

% 2h panw aristera =

B2xmin =0.361;
B2xmax=0.346;
B2x = B2xmax;
B2ymin=0.422;
B2ymax=0.426;
B2y= B2ymax;
A2x =0.359;
A2y=0.421;
C2x=0.364;
C2y=0.4215;

aktx2 = [A2x B2x C2x]+metatopisix2;
akty2 = [A2y B2y C2y]+metatopisiy2;

```

```
% 3h orizodia aristera =
B3xmin =0.356;
B3xmax=0.325;
B3x = B3xmax;
B3ymin=0.4185;
B3ymax=0.419;
B3y= B3ymax;
A3x =0.356;
A3y=0.418;
C3x=0.356;
C3y=0.4196;

aktx3 = [A3x      B3x      C3x]+metatopisix2;
akty3 = [A3y      B3y      C3y]+metatopisiy2;

% 4h katw aristera =
B4xmin =0.356;
B4xmax=0.329;
B4x = B4xmax;
B4ymin=0.416;
B4ymax=0.412;
B4y= B4ymax;
A4x =0.361;
A4y=0.4157;
C4x=0.356;
C4y=0.4163;

aktx4 = [A4x      B4x      C4x]+metatopisix2;
akty4 = [A4y      B4y      C4y]+metatopisiy2;

% 5h panw deksia=
B5xmin =0.389;
B5xmax=0.41;
B5x = B5xmax;
B5ymin=0.422;
B5ymax=0.426;
B5y= B5ymax;
A5x =0.39;
A5y=0.421;
C5x=0.388;
C5y=0.4215;

aktx5 = [A5x      B5x      C5x]+metatopisix2;
akty5 = [A5y      B5y      C5y]+metatopisiy2;

% 6h orizodia deksia =
B6xmin =0.395;
B6xmax=0.42;
B6x = B6xmax;
B6ymin=0.418;
B6ymax=0.419;
B6y= B6ymax;
A6x =0.395;
A6y=0.418;
```

```

C6x=0.395;
C6y=0.4196;

aktx6 = [A6x      B6x      C6x]+metatopisix2;
akty6 = [A6y      B6y      C6y]+metatopisiy2;

% 7h katw deksia =
B7xmin =0.392;
B7xmax=0.42;
B7x = B7xmax;
B7ymin=0.416;
B7ymax=0.412;
B7y= B7ymax;
A7x =0.39;
A7y=0.4157;
C7x=0.395;
C7y=0.4163;

aktx7 = [A7x      B7x      C7x]+metatopisix2;
akty7 = [A7y      B7y      C7y]+metatopisiy2;

% % %

fill(xdd, ydd, [0.55,
0.55, 0.55] ,xdp1,
ydp1,[0.7 0.6 0.41 ],
xdv, ydv,[0.8 0.7
0.51],...
      xpin2, ypin2 ,
[0.4 0.3, 0.2 ],...
      xpin1, ypin1 , [1 1
1 ],...

pinsk_k_x,pinsk_k_y,[0.7,
0.7,0.7],...

pinsk_a_x,pinsk_a_y,[0.4,
0.4,0.4],...

pinsk_d_x,pinsk_d_y,[0.6,
0.6,0.6],...

pinsk_p_x,pinsk_p_y,[0.3,
0.3,0.3],...
tr6x, tr6y , [0.6 0.6,
0],...
      tr1x, tr1y , [0.7
0.7, 0],...
      tr2x, tr2y , [0.8
0.8, 0],...
      tr3x, tr3y , [0.6,
0.6, 0],...
      tr4x, tr4y ,
[0.7, 0.7, 0],...
tr5x, tr5y , [0.7, 0.7,
0],...
ka3x, ka3y, [0.1451
0.4235 0.2863] ,...

ka3xb, ka3yb, [0.1451
0.4235 0.2863] ,...
ka5x, ka5y, [0.1451
0.4235 0.2863] ,ka6x,
ka6y, [0.1451 0.4235
0.2863] ,...
ka7x, ka7y, [0.1451
0.4235 0.2863] , ka10x,
ka10y, [0.1451 0.4235
0.2863],...
ka11x, ka11y, [0.1451
0.4235 0.2863], ka12x,
ka12y, [0.1451 0.4235
0.2863],...
ka13x, ka13y, [0.1451
0.4235 0.2863],...
ka14x, ka14y, [0.1451
0.4235 0.2863],...
ka18x, ka18y, [0.1451
0.4235 0.2863],...
ka19x, ka19y, [0.1451
0.4235 0.2863],...
ka20x, ka20y, [0.1451
0.4235 0.2863],...
batx1, baty1, [0.97 0.12
0],...
batx1b, baty1b, [0.35
0.35 0.35],...
batx1bb, baty1bb, [1 0
0],...
batx2, baty2, [0.7 0
0],...
batx2b, baty2b, [0.2 0.2
0.2],...

```

```

batx2bb, baty2bb, [0.9 0
0],...
batx3, baty3, [0.27 0.27
0.27],...
batpolx1, batpoly1 , [0.2
0.2 0.2],...
batpolx2, batpoly2 , [0.2
0.2 0.2],...
ka8x, ka8y, [0.1451
0.4235 0.2863],...
ka9x, ka9y, [0.1451
0.4235 0.2863],...
ka17x, ka17y, [0.1451
0.4235 0.2863],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
diakddLamprx1,
diakddLampry1 , [0.5
0.5 0.5 ],...
diakddLamprx2,
diakddLampry2, [0.24
0.24 0.24 ],...
diakddLamprx3,
diakddLampry3, [0.43
0.43 0.43 ],...
vasdiakx, vasdiaky, [0.2
0.3 0.2],...
moxlx, moxly, [0.1373
0.2157 0.1373],...
poldiakx, poldiaky, [0.1
0.1 0.1],...
dpoldiakx, dpoldiaky,
[0.1 0.1 0.1],...
ka15x, ka15y, [0.1451
0.4235 0.2863],...
ka16x, ka16y, [0.1451
0.4235 0.2863],...
dox4, doy4, [0.83 0.81
0.88],...
dox3, doy3, [0.8 0.8
0.8],...
nex3, ney3, [0.63 0.63
0.63],...
dox1, doy1, [0.83 0.81
0.78],...
nex1, ney1, [0.66 0.64
0.6],...
akmx1, akmy1, [0.7 0.7
0.7],...
akmx2, akmy2, [0.7 0.7
0.7],...
akmx3, akmy3, [0.7 0.7
0.7],...
ka48x, ka48y, [0.1451
0.4235 0.2863],...
ka49x, ka49y, [0.1451
0.4235 0.2863],...
ka55x, ka55y, [0.1451
0.4235 0.2863],...
Lamprx1, Lampry1, [0.
0.8 0.8 ],...
Lamprx2, Lampry2, [0.
0.6 0.6 ],...
Lamprx3, Lampry3, [0.
0.7 0.7],...
hlekkx, hlekky, [0.34 0.34
0.34],...
Labstx1, Labsty1 , [0.55
0.55 0.55 ],...
s1Labstx1, s1Labsty1 ,
[0.6 0.6 0.6 ],...
s2Labstx1, s2Labsty1 ,
[0.65 0.65 0.65 ],...
s3Labstx1, s3Labsty1 ,
[0.7 0.7 0.7 ],...
s4Labstx1, s4Labsty1 ,
[0.75 0.75 0.75 ],...
s5Labstx1, s5Labsty1 ,
[0.78 0.78 0.78 ],...
s6Labstx1, s6Labsty1 ,
[0.8 0.8 0.8 ],...
labx, laby, [1 1
0],...
labx1, laby1, [1 1
0.2],...
labx2, laby2, [1 1
0.4],...
labx3, laby3, [1 1
0.5],...
labx4, laby4, [1 1
0.6],...
labx5, laby5, [1 1
0.7],...
labx6, laby6, [1 1
0.8],...
labx7, laby7, [1 1
0.9],...
labx8, laby8, [1 1
1],...
labx9, laby9, [1 1
1],...
hlekkxpolx1, hlekkxpoly1,
[0.2 0.2 0.2],...
hlekkxpolx2, hlekkxpoly2,
[0.2 0.2 0.2],...
ka50x, ka50y, [0.1451
0.4235 0.2863],...
ka51x, ka51y, [0.1451
0.4235 0.2863],...
ka52x, ka52y, [0.1451
0.4235 0.2863],...
ka53x, ka53y, [0.1451
0.4235 0.2863],...
ka54x, ka54y, [0.1451
0.4235 0.2863],...
ka56x, ka56y, [0.1451
0.4235 0.2863],...
ka57x, ka57y, [0.1451
0.4235 0.2863],...

```

```

ka58x, ka58y, [0.1451
0.4235 0.2863],...
nex4, ney4, [0.7 0.7
0.7],...
kka45x, kka45y, [0.6 0.2
0],...
kka45bx, kka45by, [0.76
0.36 0],...
kka45cx, kka45cy, [0.8
0.4 0],...
kka46x, kka46y, [0.6 0.1
0],...
ka45bx, ka45by, [0.76
0.36 0],...
ka45cx, ka45cy, [0.8 0.4
0],...
ka45x, ka45y, [0.6 0.2
0],...
dox2, doy2, [0.75 0.7
0.7],...
nex2, ney2, [0.5 0.5
0.5],...
ka47x, ka47y, [0.1451
0.4235 0.2863],...
ka45dx,ka45dy, [0.5 0.2
0],...
ka46x, ka46y, [0.6 0.1
0],...
%

axis([0 0.85 0.37 0.5]);

text(0.3 , 0.49, 'Διακόπτης κλειστός', 'FontSize',9 )

text(0.30 , 0.455, '+', 'FontSize',14, 'Color', [0.7451 0.03137
0.03137] )
text(0.336, 0.455, '-', 'FontSize',18,'Color', 'b' )

text(0.45 , 0.45+0.015, 'Διάλυμα χλωριούχου νατρίου',
'FontSize',9 )
text(0.45 , 0.445+0.015, 'Διέρχεται ηλεκτρικό ρεύμα',
'FontSize',9 )
axis off

set(handles.pushbutton5,'enable','on')
set(handles.pushbutton6,'enable','on')

% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton3 (see GCBO)
% eventdata reserved - to be defined in a future version of
MATLAB
% handles structure with handles and user data (see GUIDATA)
global stam;

if (stam==0)
set(handles.pushbutton3,'string','Συνέχεια')

```

```
        set(handles.pushbutton5, 'enable', 'on')
        set(handles.pushbutton6, 'enable', 'on')
        stam=1;
elseif (stam==1)
    set(handles.pushbutton3, 'string', 'Διακοπή')
    set(handles.pushbutton5, 'enable', 'off')
    set(handles.pushbutton6, 'enable', 'off')
    stam=0;
else
end
guidata(hObject, handles);

% --- Executes on button press in pushbutton4.
% function pushbutton4_Callback(hObject, eventdata, handles)
% % hObject    handle to pushbutton4 (see GCBO)
% % eventdata  reserved - to be defined in a future version of
MATLAB
% % handles    structure with handles and user data (see
GUIDATA)
% global suv;
% global stam;
% suv=get(handles.pushbutton4, 'value');
% stam=0;

% --- Executes on button press in pushbutton5.
function pushbutton5_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton5 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
global ryt;
global status;
status=1;
axes(handles.axes1)
cla
clear ryt;
set(handles.edit1, 'enable', 'on', 'string', '5');
set(handles.pushbutton2, 'enable', 'on')
guidata(hObject, handles);

% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton6 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
global status;
global stam;
hfin=questdlg('Εξοδος από το πρόγραμμα;');
switch hfin
    case 'Yes'
        stam=1;
        status=1;
        closereq;
end
```

```

% --- Executes on button press in pushbutton7.
function pushbutton7_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton7 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
! help_eik_3_15a.pdf;
    
```

Ο κώδικας χρησιμοποιεί το αρχείο `help_eik_3_15a.pdf` για να δείξει την βοήθεια του παραδείγματος

- ***Gfig_3_15b.m***

```

function varargout = gfig_3_15b(varargin)
% GFIG_3_15B M-file for gfig_3_15b.fig
%     GFIG_3_15B, by itself, creates a new GFIG_3_15B or
raises the existing
%     singleton*.
%
%     H = GFIG_3_15B returns the handle to a new GFIG_3_15B or
the handle to
%     the existing singleton*.
%
%     GFIG_3_15B('CALLBACK',hObject,eventData,handles,...)
calls the local
%     function named CALLBACK in GFIG_3_15B.M with the given
input arguments.
%
%     GFIG_3_15B('Property','Value',...) creates a new
GFIG_3_15B or raises the
%     existing singleton*. Starting from the left, property
value pairs are
%     applied to the GUI before gfig_3_15b_OpeningFcn gets
called. An
%     unrecognized property name or invalid value makes
property application
%     stop. All inputs are passed to gfig_3_15b_OpeningFcn
via varargin.
%
%     *See GUI Options on GUIDE's Tools menu. Choose "GUI
allows only one
%     instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help gfig_3_15b

% Last Modified by GUIDE v2.5 28-Oct-2011 11:25:52

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
'gui_Singleton',  gui_Singleton, ...
'gui_OpeningFcn', @gfig_3_15b_OpeningFcn, ...
'gui_OutputFcn',  @gfig_3_15b_OutputFcn, ...
'gui_LayoutFcn',  [] , ...
'gui_Callback',   []);
    
```

```
if nargin && ischar(varargin{1})
gui_State.gui_Callback = str2func(varargin{1});
end

if nargin
[varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT

% --- Executes just before gfig_3_15b is made visible.
function gfig_3_15b_OpeningFcn(hObject, eventdata, handles,
varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to gfig_3_15b (see
VARARGIN)

% Choose default command line output for gfig_3_15b
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes gfig_3_15b wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command
line.
function varargout = gfig_3_15b_OutputFcn(hObject, eventdata,
handles)
% varargout  cell array for returning output args (see
VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

function edit1_Callback(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit1 as
text
%         str2double(get(hObject,'String')) returns contents of
edit1 as a double
```



```

% --- Executes during object creation, after setting all
properties.
function edit1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    empty - handles not created until after all
CreateFcns called

% Hint: edit controls usually have a white background on
Windows.
%         See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUiControlBackgroundColor'))
set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in pushbutton1.
% function pushbutton1_Callback(hObject, eventdata, handles)
% % hObject    handle to pushbutton1 (see GCBO)
% % eventdata  reserved - to be defined in a future version of
MATLAB
% % handles    structure with handles and user data (see
GUIDATA)
% global ryt;
% ryt=str2double(get(handles.edit1,'String'));

% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
global ryt;
ryt=str2double(get(handles.edit1,'String'));

global status;
global stam;
global suv;
axes(handles.axes1)
axis off;
set(handles.pushbutton3,'string','Διακοπή')
stam=0;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
stam=0;
suv=0;
status=0;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
set(handles.edit1,'enable','off');
set(handles.pushbutton2,'enable','off')
set(handles.pushbutton5,'enable','off')
set(handles.pushbutton6,'enable','off')

if ryt <0.001|ryt > 5
hfin=warndlg('Βάλτε στο Ρυθμό Προσομοίωσης τιμή μεταξύ 0.001
και 5');

```

```

return
else
end
ryte = -ryt+5+0.001;

v=1 ;

% AGWGOS
agx = [2 3 3 2];
agy = [1 1 2 2];

rax = 0.03;
ray = 0.5;
f=0:pi/20:2*pi;

metb1=0.05;
basx1 =[2 2.03 2.03 2]-metb1;
basy1 = [1 1 2 2];

basbx1 =[2 1.95 1.95 2]-metb1;
basby1 = [1 1.2 2.2 2];

bascx1 =[2 2.03 1.98 1.95]-metb1;
bascy1 = [2 2 2.2 2.2];

metb2 = 1.09;
basx2 =basx1+metb2;
basy2 =basy1;

basbx2 =basbx1+metb2;
basby2 =basby1;

bascx2 =bascx1+metb2;
bascy2 =bascy1;

% basx3 =2.5+rax*cos(f);
% basy3 =basy1;

% YPOBATHRO

ypovx = [-0.5 4 4 -0.5];
ypovy = [-0.5 -0.5 3.5 3.5];

% HLEKTRONIA
f1 = 0:pi/20:2*pi;
rx = 0.022;
ry = 0.03;
met1 = 0.7 ;
met2 = 0.7;
basi = 3.0;

xcl= 2.35+rx*cos(f1);
ycl= 2.4+ry*sin(f1);
s1xcl=
2.35+0.9*rx*cos(f1);
s1ycl=
2.4+0.9*ry*sin(f1);

s2xcl=
2.35+0.6*rx*cos(f1);
s2ycl=
2.4+0.6*ry*sin(f1);
s3xcl=
2.35+0.3*rx*cos(f1);
s3ycl=
2.4+0.3*ry*sin(f1);
s4xcl=
2.35+0.2*rx*cos(f1);
s4ycl=
2.4+0.2*ry*sin(f1);

xna=
2.35+met1*rx*cos(f1);

```

```

yna=
2.3+met1*rye*sin(f1);
s1xna=
2.35+met1*0.9*rx*cos(f1)
;
s1yna=
2.3+met1*0.9*rye*sin(f1);
s2xna=
2.35+met1*0.6*rx*cos(f1)
;
s2yna=
2.3+met1*0.6*rye*sin(f1);
s3xna=
2.35+met1*0.2*rx*cos(f1)
;
s3yna=
2.3+met1*0.2*rye*sin(f1);

% atomo xlwrio apo to
opoio prokryptoun ola ta
alla
x00 = rx*cos(f1);
s1x00 = 0.9*rx*cos(f1);
s2x00 = 0.6*rx*cos(f1);
s3x00 = 0.3*rx*cos(f1);
s4x00 = 0.2*rx*cos(f1);

% atomo natrio apo to
opoio prokryptoun ola ta
alla
wx00 = met1*rx*cos(f1);
s1wx00 =
0.9*met1*rx*cos(f1);
s2wx00 =
0.6*met1*rx*cos(f1);
s3wx00 =
0.2*met1*rx*cos(f1);

x01 = 2.3;
y01 = 1.5;
s1 = basi-x01;
t11 = s1/v;
t12 = (x01-2)/v;
T = t11+t12;

x1 = x01+rx*cos(f1);
y1 = y01+rye*sin(f1);
s1x1
=x01+0.9*rx*cos(f1);
s1y1
=y01+0.9*rye*sin(f1);
s2x1
=x01+0.6*rx*cos(f1);
s2y1
=y01+0.6*rye*sin(f1);
s3x1
=x01+0.3*rx*cos(f1);
s3y1
=y01+0.3*rye*sin(f1);

s4x1
=x01+0.2*rx*cos(f1);
s4y1
=y01+0.2*rye*sin(f1);

wx1
=x01+met1*rx*cos(f1);
wy1
=y01+met2*rye*sin(f1)-
0.18;
s1wx1
=x01+met1*0.9*rx*cos(f1)
;
s1wy1
=y01+met2*0.9*rye*sin(f1)
-0.18;
s2wx1
=x01+met1*0.6*rx*cos(f1)
;
s2wy1
=y01+met2*0.6*rye*sin(f1)
-0.18;
s3wx1
=x01+met1*0.2*rx*cos(f1)
;
s3wy1
=y01+met2*0.2*rye*sin(f1)
-0.18;

x02 = 2.1;
y02 = 1.2;
s2 = basi-x02;
t21 = s2/v;
t22 = (x02-2)/v;
x2 = x02+rx*cos(f1);
y2 = y02+rye*sin(f1);
s1x2
=x02+0.9*rx*cos(f1);
s1y2
=y02+0.9*rye*sin(f1);
s2x2
=x02+0.6*rx*cos(f1);
s2y2
=y02+0.6*rye*sin(f1);
s3x2
=x02+0.3*rx*cos(f1);
s3y2
=y02+0.3*rye*sin(f1);
s4x2
=x02+0.2*rx*cos(f1);
s4y2
=y02+0.2*rye*sin(f1);

wx2
=x02+met1*rx*cos(f1);

```

```

wy2
=y02+met2*rye*sin(f1) -
0.11;
s1wx2
=x02+met1*0.9*rxex*cos(f1)
;
s1wy2
=y02+met2*0.9*rye*sin(f1)
-0.11;
s2wx2
=x02+met1*0.6*rxex*cos(f1)
;
s2wy2
=y02+met2*0.6*rye*sin(f1)
-0.11;
s3wx2
=x02+met1*0.2*rxex*cos(f1)
;
s3wy2
=y02+met2*0.2*rye*sin(f1)
-0.11;

x03 = 2.6;
y03 = 1.8;
s3 = basi-x03;
t31 = s3/v;
t32 = (x03-2)/v;
x3 =x03+rxex*cos(f1);
y3 =y03+rye*sin(f1);
s1x3
=x03+0.9*rxex*cos(f1);
s1y3
=y03+0.9*rye*sin(f1);
s2x3
=x03+0.6*rxex*cos(f1);
s2y3
=y03+0.6*rye*sin(f1);
s3x3
=x03+0.3*rxex*cos(f1);
s3y3
=y03+0.3*rye*sin(f1);
s4x3
=x03+0.2*rxex*cos(f1);
s4y3
=y03+0.2*rye*sin(f1);

wx3
=x03+met1*rxex*cos(f1);
wy3
=y03+met2*rye*sin(f1) -
0.1;
s1wx3
=x03+met1*0.9*rxex*cos(f1)
;
s1wy3
=y03+met2*0.9*rye*sin(f1)
-0.1;

s2wx3
=x03+met1*0.6*rxex*cos(f1)
;
s2wy3
=y03+met2*0.6*rye*sin(f1)
-0.1;
s3wx3
=x03+met1*0.2*rxex*cos(f1)
;
s3wy3
=y03+met2*0.2*rye*sin(f1)
-0.1;

x04 = 2.2;
y04 = 1.7;
s4 = basi-x04;
t41 = s4/v;
t42 = (x04-2)/v;
x4 =x04+rxex*cos(f1);
y4 =y04+rye*sin(f1);
s1x4
=x04+0.9*rxex*cos(f1);
s1y4
=y04+0.9*rye*sin(f1);
s2x4
=x04+0.6*rxex*cos(f1);
s2y4
=y04+0.6*rye*sin(f1);
s3x4
=x04+0.3*rxex*cos(f1);
s3y4
=y04+0.3*rye*sin(f1);
s4x4
=x04+0.2*rxex*cos(f1);
s4y4
=y04+0.2*rye*sin(f1);

wx4
=x04+met1*rxex*cos(f1);
wy4
=y04+met2*rye*sin(f1)+0.1
6;
s1wx4
=x04+met1*0.9*rxex*cos(f1)
;
s1wy4
=y04+met2*0.9*rye*sin(f1)
+0.16;
s2wx4
=x04+met1*0.6*rxex*cos(f1)
;
s2wy4
=y04+met2*0.6*rye*sin(f1)
+0.16;
s3wx4
=x04+met1*0.2*rxex*cos(f1)
;

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```

s3wy4
=y04+met2*0.2*rye*sin(f1)
+0.16;

x05 = 2.3;
y05 = 1.25;
s5 = basi-x05;
t51 = s5/v;
t52 = (x05-2)/v;
x5 =x05+rx*cos(f1);
y5 =y05+rye*sin(f1);
s1x5
=x05+0.9*rx*cos(f1);
s1y5
=y05+0.9*rye*sin(f1);
s2x5
=x05+0.6*rx*cos(f1);
s2y5
=y05+0.6*rye*sin(f1);
s3x5
=x05+0.3*rx*cos(f1);
s3y5
=y05+0.3*rye*sin(f1);
s4x5
=x05+0.2*rx*cos(f1);
s4y5
=y05+0.2*rye*sin(f1);
wx5
=x05+met1*rx*cos(f1);
wy5
=y05+met2*rye*sin(f1)+0.14;
s1wx5
=x05+met1*0.9*rx*cos(f1)
;
s1wy5
=y05+met2*0.9*rye*sin(f1)
+0.14;
s2wx5
=x05+met1*0.6*rx*cos(f1)
;
s2wy5
=y05+met2*0.6*rye*sin(f1)
+0.14;
s3wx5
=x05+met1*0.2*rx*cos(f1)
;
s3wy5
=y05+met2*0.2*rye*sin(f1)
+0.14;
x06 = 2.7;
y06 = 1.2;
s6 = basi-x06;
t61 = s6/v;
t62 = (x06-2)/v;
x6 =x06+rx*cos(f1);
y6 =y06+rye*sin(f1);
s1x6
=x06+0.9*rx*cos(f1);
s1y6
=y06+0.9*rye*sin(f1);
s2x6
=x06+0.6*rx*cos(f1);
s2y6
=y06+0.6*rye*sin(f1);
s3x6
=x06+0.3*rx*cos(f1);
s3y6
=y06+0.3*rye*sin(f1);
s4x6
=x06+0.2*rx*cos(f1);
s4y6
=y06+0.2*rye*sin(f1);
wx6
=x06+met1*rx*cos(f1);
wy6
=y06+met2*0.9*rye*sin(f1)
+0.11;
s1wx6
=x06+met1*0.9*rx*cos(f1)
;
s1wy6
=y06+met2*0.9*rye*sin(f1)
+0.11;
s2wx6
=x06+met1*0.6*rx*cos(f1)
;
s2wy6
=y06+met2*0.6*rye*sin(f1)
+0.11;
s3wx6
=x06+met1*0.2*rx*cos(f1)
;
s3wy6
=y06+met2*0.2*rye*sin(f1)
+0.11;

x07 = 2.4;
y07 = 1.4;
s7 = basi-x07;
t71 = s7/v;
t72 = (x07-2)/v;
x7 =x07+rx*cos(f1);
y7 =y07+rye*sin(f1);
s1x7
=x07+0.9*rx*cos(f1);
s1y7
=y07+0.9*rye*sin(f1);
s2x7
=x07+0.6*rx*cos(f1);
s2y7
=y07+0.6*rye*sin(f1);
s3x7
=x07+0.3*rx*cos(f1);
s3y7
=y07+0.3*rye*sin(f1);
s4x7
=x07+0.2*rx*cos(f1);

```

```

s4y7
=y07+0.2*rye*sin(f1);
wx7
=x07+met1*rxe*cos(f1);
wy7
=y07+met2*rye*sin(f1)+0.1
5;
s1wx7
=x07+met1*0.9*rxe*cos(f1)
;
s1wy7
=y07+met2*0.9*rye*sin(f1)
+0.15;
s2wx7
=x07+met1*0.6*rxe*cos(f1)
;
s2wy7
=y07+met2*0.6*rye*sin(f1)
+0.15;
s3wx7
=x07+met1*0.2*rxe*cos(f1)
;
s3wy7
=y07+met2*0.2*rye*sin(f1)
+0.15;

x08 = 2.8;
y08 = 1.7;
s8 = basi-x08;
t81 = s8/v;
t82 = (x08-2)/v;
x8 =x08+rxe*cos(f1);
y8 =y08+rye*sin(f1);
s1x8
=x08+0.9*rxe*cos(f1);
s1y8
=y08+0.9*rye*sin(f1);
s2x8
=x08+0.6*rxe*cos(f1);
s2y8
=y08+0.6*rye*sin(f1);
s3x8
=x08+0.3*rxe*cos(f1);
s3y8
=y08+0.3*rye*sin(f1);
s4x8
=x08+0.2*rxe*cos(f1);
s4y8
=y08+0.2*rye*sin(f1);
wx8
=x08+met1*rxe*cos(f1);
wy8
=y08+met2*rye*sin(f1)+0.1
2;
s1wx8
=x08+met1*0.9*rxe*cos(f1)
;
s1wy8
=y08+met2*0.9*rye*sin(f1)
+0.12;

s2wx8
=x08+met1*0.6*rxe*cos(f1)
;
s2wy8
=y08+met2*0.6*rye*sin(f1)
+0.12;
s3wx8
=x08+met1*0.2*rxe*cos(f1)
;
s3wy8
=y08+met2*0.2*rye*sin(f1)
+0.12;

x09 = 2.7;
y09 = 1.63;
s9 = basi-x09;
t91 = s9/v;
t92 = (x09-2)/v;
x9 =x09+rxe*cos(f1);
y9 =y09+rye*sin(f1);
s1x9
=x09+0.9*rxe*cos(f1);
s1y9
=y09+0.9*rye*sin(f1);
s2x9
=x09+0.6*rxe*cos(f1);
s2y9
=y09+0.6*rye*sin(f1);
s3x9
=x09+0.3*rxe*cos(f1);
s3y9
=y09+0.3*rye*sin(f1);
s4x9
=x09+0.2*rxe*cos(f1);
s4y9
=y09+0.2*rye*sin(f1);
wx9
=x09+met1*rxe*cos(f1);
wy9
=y09+met2*rye*sin(f1)-
0.1;
s1wx9
=x09+met1*0.9*rxe*cos(f1)
;
s1wy9
=y09+met2*0.9*rye*sin(f1)
-0.1;
s2wx9
=x09+met1*0.6*rxe*cos(f1)
;
s2wy9
=y09+met2*0.6*rye*sin(f1)
-0.1;
s3wx9
=x09+met1*0.2*rxe*cos(f1)
;
s3wy9
=y09+met2*0.2*rye*sin(f1)
-0.1;

```

```

x010 = 2.1;
y010 = 1.46;
s10 = basi-x010;
t101 = s10/v;
t102 = (x010-2)/v;
x10 =x010+rxex*cos(f1);
y10 =y010+ryes*sin(f1);
s1x10
=x010+0.9*rxex*cos(f1);
s1y10
=y010+0.9*ryes*sin(f1);
s2x10
=x010+0.6*rxex*cos(f1);
s2y10
=y010+0.6*ryes*sin(f1);
s3x10
=x010+0.3*rxex*cos(f1);
s3y10
=y010+0.3*ryes*sin(f1);
s4x10
=x010+0.2*rxex*cos(f1);
s4y10
=y010+0.2*ryes*sin(f1);
wx10
=x010+met1*rxex*cos(f1);
wy10
=y010+met2*ryes*sin(f1)-
0.12;
s1wx10
=x010+met1*0.9*rxex*cos(f1
);
s1wy10
=y010+met2*0.9*ryes*sin(f1
)-0.12;
s2wx10
=x010+met1*0.6*rxex*cos(f1
);
s2wy10
=y010+met2*0.6*ryes*sin(f1
)-0.12;
s3wx10
=x010+met1*0.2*rxex*cos(f1
);
s3wy10
=y010+met2*0.2*ryes*sin(f1
)-0.12;

x011 = 2.2;
y011 = 1.34;
s11 = basi-x011;
t111 = s11/v;
t112 = (x011-2)/v;
x11 =x011+rxex*cos(f1);
y11 =y011+ryes*sin(f1);
s1x11
=x011+0.9*rxex*cos(f1);
s1y11
=y011+0.9*ryes*sin(f1);

s2x11
=x011+0.6*rxex*cos(f1);
s2y11
=y011+0.6*ryes*sin(f1);
s3x11
=x011+0.3*rxex*cos(f1);
s3y11
=y011+0.3*ryes*sin(f1);
s4x11
=x011+0.2*rxex*cos(f1);
s4y11
=y011+0.2*ryes*sin(f1);
wx11
=x011+met1*rxex*cos(f1);
wy11
=y011+met2*ryes*sin(f1)-
0.16;
s1wx11
=x011+met1*0.9*rxex*cos(f1
);
s1wy11
=y011+met2*0.9*ryes*sin(f1
)-0.16;
s2wx11
=x011+met1*0.6*rxex*cos(f1
);
s2wy11
=y011+met2*0.6*ryes*sin(f1
)-0.16;
s3wx11
=x011+met1*0.2*rxex*cos(f1
);
s3wy11
=y011+met2*0.2*ryes*sin(f1
)-0.16;

x012 = 2.4;
y012 = 1.8;
s12 = basi-x012;
t121 = s12/v;
t122 = (x012-2)/v;
x12 =x012+rxex*cos(f1);
y12 =y012+ryes*sin(f1);
s1x12
=x012+0.9*rxex*cos(f1);
s1y12
=y012+0.9*ryes*sin(f1);
s2x12
=x012+0.6*rxex*cos(f1);
s2y12
=y012+0.6*ryes*sin(f1);
s3x12
=x012+0.3*rxex*cos(f1);
s3y12
=y012+0.3*ryes*sin(f1);
s4x12
=x012+0.2*rxex*cos(f1);
s4y12
=y012+0.2*ryes*sin(f1);

```

```

wx12
=x012+met1*rxex*cos (f1);
wy12
=y012+met2*ryex*sin (f1)-
0.19;
s1wx12
=x012+met1*0.9*rxex*cos (f1
);
s1wy12
=y012+met2*0.9*ryex*sin (f1
)-0.19;
s2wx12
=x012+met1*0.6*rxex*cos (f1
);
s2wy12
=y012+met2*0.6*ryex*sin (f1
)-0.19;
s3wx12
=x012+met1*0.2*rxex*cos (f1
);
s3wy12
=y012+met2*0.2*ryex*sin (f1
)-0.19;

x013 = 2.45;
y013 = 1.6;
s13 = basi-x013;
t131 = s13/v;
t132 = (x013-2)/v;
x13 =x013+rxex*cos (f1);
y13 =y013+ryex*sin (f1);
s1x13
=x013+0.9*rxex*cos (f1);
s1y13
=y013+0.9*ryex*sin (f1);
s2x13
=x013+0.6*rxex*cos (f1);
s2y13
=y013+0.6*ryex*sin (f1);
s3x13
=x013+0.3*rxex*cos (f1);
s3y13
=y013+0.3*ryex*sin (f1);
s4x13
=x013+0.2*rxex*cos (f1);
s4y13
=y013+0.2*ryex*sin (f1);
wx13
=x013+met1*rxex*cos (f1);
wy13
=y013+met2*ryex*sin (f1)+0.
1;
s1wx13
=x013+met1*0.9*rxex*cos (f1
);
s1wy13
=y013+met2*0.9*ryex*sin (f1
)+0.1;

s2wx13
=x013+met1*0.6*rxex*cos (f1
);
s2wy13
=y013+met2*0.6*ryex*sin (f1
)+0.1;
s3wx13
=x013+met1*0.2*rxex*cos (f1
);
s3wy13
=y013+met2*0.2*ryex*sin (f1
)+0.1;

x014 = 2.65;
y014 = 1.48;
s14 = basi-x014;
t141 = s14/v;
t142 = (x014-2)/v;
x14 =x014+rxex*cos (f1);
y14 =y014+ryex*sin (f1);
s1x14
=x014+0.9*rxex*cos (f1);
s1y14
=y014+0.9*ryex*sin (f1);
s2x14
=x014+0.6*rxex*cos (f1);
s2y14
=y014+0.6*ryex*sin (f1);
s3x14
=x014+0.3*rxex*cos (f1);
s3y14
=y014+0.3*ryex*sin (f1);
s4x14
=x014+0.2*rxex*cos (f1);
s4y14
=y014+0.2*ryex*sin (f1);
wx14
=x014+met1*rxex*cos (f1);
wy14
=y014+met2*ryex*sin (f1)+0.
16;
s1wx14
=x014+met1*0.9*rxex*cos (f1
);
s1wy14
=y014+met2*0.9*ryex*sin (f1
)+0.16;
s2wx14
=x014+met1*0.6*rxex*cos (f1
);
s2wy14
=y014+met2*0.6*ryex*sin (f1
)+0.16;
s3wx14
=x014+met1*0.2*rxex*cos (f1
);
s3wy14
=y014+met2*0.2*ryex*sin (f1
)+0.16;

```



```

x015 = 2.9;
y015 = 1.3;
s15 = basi-x015;
t151 = s15/v;
t152 = (x015-2)/v;
x15 =x015+rxex*cos(f1);
y15 =y015+ryex*sin(f1);
s1x15
=x015+0.9*rxex*cos(f1);
s1y15
=y015+0.9*ryex*sin(f1);
s2x15
=x015+0.6*rxex*cos(f1);
s2y15
=y015+0.6*ryex*sin(f1);
s3x15
=x015+0.3*rxex*cos(f1);
s3y15
=y015+0.3*ryex*sin(f1);
s4x15
=x015+0.2*rxex*cos(f1);
s4y15
=y015+0.2*ryex*sin(f1);
wx15
=x015+met1*rxex*cos(f1);
wy15
=y015+met2*ryex*sin(f1)+0.11;
s1wx15
=x015+met1*0.9*rxex*cos(f1);
s1wy15
=y015+met2*0.9*ryex*sin(f1)+0.11;
s2wx15
=x015+met1*0.6*rxex*cos(f1);
s2wy15
=y015+met2*0.6*ryex*sin(f1)+0.11;
s3wx15
=x015+met1*0.2*rxex*cos(f1);
s3wy15
=y015+met2*0.2*ryex*sin(f1)+0.11;

x016= 2.8;
y016 = 1.45;
s16 = basi-x016;
t161 = s16/v;
t162 = (x016-2)/v;
x16 =x016+rxex*cos(f1);
y16 =y016+ryex*sin(f1);
s1x16
=x016+0.9*rxex*cos(f1);
s1y16
=y016+0.9*ryex*sin(f1);
s2x16
=x016+0.6*rxex*cos(f1);
s2y16
=y016+0.6*ryex*sin(f1);
s3x16
=x016+0.3*rxex*cos(f1);
s3y16
=y016+0.3*ryex*sin(f1);
s4x16
=x016+0.2*rxex*cos(f1);
s4y16
=y016+0.2*ryex*sin(f1);
wx16
=x016+met1*rxex*cos(f1);
wy16
=y016+met2*ryex*sin(f1)-0.1;
s1wx16
=x016+met1*0.9*rxex*cos(f1);
s1wy16
=y016+met2*0.9*ryex*sin(f1)-0.1;
s2wx16
=x016+met1*0.6*rxex*cos(f1);
s2wy16
=y016+met2*0.6*ryex*sin(f1)-0.1;
s3wx16
=x016+met1*0.2*rxex*cos(f1);
s3wy16
=y016+met2*0.2*ryex*sin(f1)-0.1;

x017= 2.95;
y017 = 1.65;
s17 = basi-x017;
t171 = s17/v;
t172 = (x017-2)/v;
x17 =x017+rxex*cos(f1);
y17 =y017+ryex*sin(f1);
s1x17
=x017+0.9*rxex*cos(f1);
s1y17
=y017+0.9*ryex*sin(f1);
s2x17
=x017+0.6*rxex*cos(f1);
s2y17
=y017+0.6*ryex*sin(f1);
s3x17
=x017+0.3*rxex*cos(f1);
s3y17
=y017+0.3*ryex*sin(f1);
s4x17
=x017+0.2*rxex*cos(f1);
s4y17
=y017+0.2*ryex*sin(f1);
wx17
=x017+met1*rxex*cos(f1);

```

```
wy17
=y017+met2*rye*sin(f1)-
0.14;
slwx17
=x017+met1*0.9*rx*cos(f1
);
slwy17
=y017+met2*0.9*rye*sin(f1
)-0.14;
s2wx17
=x017+met1*0.6*rx*cos(f1
);
s2wy17
=y017+met2*0.6*rye*sin(f1
)-0.14;
s3wx17
=x017+met1*0.2*rx*cos(f1
);
s3wy17
=y017+met2*0.2*rye*sin(f1
)-0.14;

x018= 2.07;
y018 = 1.9;
s18 = basi-x018;
t181 = s18/v;
t182 = (x018-2)/v;
x18 =x018+rx*cos(f1);
y18 =y018+rye*sin(f1);
s1x18
=x018+0.9*rx*cos(f1);
s1y18
=y018+0.9*rye*sin(f1);
s2x18
=x018+0.6*rx*cos(f1);
s2y18
=y018+0.6*rye*sin(f1);
s3x18
=x018+0.3*rx*cos(f1);
s3y18
=y018+0.3*rye*sin(f1);
s4x18
=x018+0.2*rx*cos(f1);
s4y18
=y018+0.2*rye*sin(f1);
wx18=x018+met1*rx*cos(f1
);
wy18
=y018+met2*rye*sin(f1)-
0.12;
slwx18
=x018+met1*0.9*rx*cos(f1
);
slwy18
=y018+met2*0.9*rye*sin(f1
)-0.12;
s2wx18
=x018+met1*0.6*rx*cos(f1
);
s2wy18
=y018+met2*0.6*rye*sin(f1
)-0.12;
s3wx18
=x018+met1*0.2*rx*cos(f1
);
s3wy18
=y018+met2*0.2*rye*sin(f1
)-0.12;

x019= 2.9;
y019 = 1.82;
s19 = basi-x019;
t191 = s19/v;
t192 = (x019-2)/v;
x19 =x019+rx*cos(f1);
y19 =y019+rye*sin(f1);
s1x19
=x019+0.9*rx*cos(f1);
s1y19
=y019+0.9*rye*sin(f1);
s2x19
=x019+0.6*rx*cos(f1);
s2y19
=y019+0.6*rye*sin(f1);
s3x19
=x019+0.3*rx*cos(f1);
s3y19
=y019+0.3*rye*sin(f1);
s4x19
=x019+0.2*rx*cos(f1);
s4y19
=y019+0.2*rye*sin(f1);
wx19
=x019+met1*rx*cos(f1);
wy19
=y019+met2*rye*sin(f1)-
0.17;
slwx19
=x019+met1*0.9*rx*cos(f1
);
slwy19
=y019+met2*0.9*rye*sin(f1
)-0.17;
s2wx19
=x019+met1*0.6*rx*cos(f1
);
s2wy19
=y019+met2*0.6*rye*sin(f1
)-0.17;
s3wx19
=x019+met1*0.2*rx*cos(f1
);
s3wy19
=y019+met2*0.2*rye*sin(f1
)-0.17;

x020= 2.6;
y020 = 1.3;
s20 = basi-x020;
```

```

t201 = s20/v;
t202 = (x020-2)/v;
x20 =x020+rxex*cos(f1);
y20 =y020+ryex*sin(f1);
s1x20
=x020+0.9*rxex*cos(f1);
s1y20
=y020+0.9*ryex*sin(f1);
s2x20
=x020+0.6*rxex*cos(f1);
s2y20
=y020+0.6*ryex*sin(f1);
s3x20
=x020+0.3*rxex*cos(f1);
s3y20
=y020+0.3*ryex*sin(f1);
s4x20
=x020+0.2*rxex*cos(f1);
s4y20
=y020+0.2*ryex*sin(f1);
wx20
=x020+met1*rxex*cos(f1);
wy20
=y020+met2*ryex*sin(f1)-
0.08;
s1wx20
=x020+met1*0.9*rxex*cos(f1
);
s1wy20
=y020+met2*0.9*ryex*sin(f1
)-0.08;
s2wx20
=x020+met1*0.6*rxex*cos(f1
);
s2wy20
=y020+met2*0.6*ryex*sin(f1
)-0.08;
s3wx20
=x020+met1*0.2*rxex*cos(f1
);
s3wy20
=y020+met2*0.2*ryex*sin(f1
)-0.08;

fill(ypovx, ypovy, [0.9
0.9 0.9] ,...
basx1, basy1, [0.76 0.36
0] ,...
basbx1, basby1, [0.6 0.2
0] ,...
bascx1, bascy1, [0.8 0.4
0] ,...
basx2, basy2, [0.76 0.36
0] ,...
basbx2, basby2, [0.6 0.2
0] ,...
bascx2, bascy2, [0.8 0.4
0] ,...
x1, y1, [0.2 0.7
0.2],...
s1x1, s1y1, [0.3 0.75
0.3],...
s2x1, s2y1, [0.4 0.8
0.4],...
s3x1, s3y1, [0.5 0.85
0.5],...
s4x1, s4y1, [0.6 0.9
0.6],...
x2, y2, [0.2 0.7
0.2],...
s1x2, s1y2, [0.3 0.75
0.3],...
s2x2, s2y2, [0.4 0.8
0.4],...
s3x2, s3y2, [0.5 0.85
0.5],...
s4x2, s4y2, [0.6 0.9
0.6],...
x3, y3, [0.2 0.7
0.2],...
s1x3, s1y3, [0.3 0.75
0.3],...
s2x3, s2y3, [0.4 0.8
0.4],...
s3x3, s3y3, [0.5 0.85
0.5],...
s4x3, s4y3, [0.6 0.9
0.6],...
x4, y4, [0.2 0.7
0.2],...
s1x4, s1y4, [0.3 0.75
0.3],...
s2x4, s2y4, [0.4 0.8
0.4],...
s3x4, s3y4, [0.5 0.85
0.5],...
s4x4, s4y4, [0.6 0.9
0.6],...
x5, y5, [0.2 0.7
0.2],...
s1x5, s1y5, [0.3 0.75
0.3],...
s2x5, s2y5, [0.4 0.8
0.4],...
s3x5, s3y5, [0.5 0.85
0.5],...
s4x5, s4y5, [0.6 0.9
0.6],...
x6, y6, [0.2 0.7
0.2],...
s1x6, s1y6, [0.3 0.75
0.3],...
s2x6, s2y6, [0.4 0.8
0.4],...
s3x6, s3y6, [0.5 0.85
0.5],...
s4x6, s4y6, [0.6 0.9
0.6],...
x7, y7, [0.2 0.7
0.2],...

```

s1x7, s1y7, [0.3 0.75 0.3],...	s1x13, s1y13, [0.3 0.75 0.3],...
s2x7, s2y7, [0.4 0.8 0.4],...	s2x13, s2y13, [0.4 0.8 0.4],...
s3x7, s3y7, [0.5 0.85 0.5],...	s3x13, s3y13, [0.5 0.85 0.5],...
s4x7, s4y7, [0.6 0.9 0.6],...	s4x13, s4y13, [0.6 0.9 0.6],...
x8, y8, [0.2 0.7 0.2],...	x14, y14, [0.2 0.7 0.2],...
s1x8, s1y8, [0.3 0.75 0.3],...	s1x14, s1y14, [0.3 0.75 0.3],...
s2x8, s2y8, [0.4 0.8 0.4],...	s2x14, s2y14, [0.4 0.8 0.4],...
s3x8, s3y8, [0.5 0.85 0.5],...	s3x14, s3y14, [0.5 0.85 0.5],...
s4x8, s4y8, [0.6 0.9 0.6],...	s4x14, s4y14, [0.6 0.9 0.6],...
x9, y9, [0.2 0.7 0.2],...	x15, y15, [0.2 0.7 0.2],...
s1x9, s1y9, [0.3 0.75 0.3],...	s1x15, s1y15, [0.3 0.75 0.3],...
s2x9, s2y9, [0.4 0.8 0.4],...	s2x15, s2y15, [0.4 0.8 0.4],...
s3x9, s3y9, [0.5 0.85 0.5],...	s3x15, s3y15, [0.5 0.85 0.5],...
s4x9, s4y9, [0.6 0.9 0.6],...	s4x15, s4y15, [0.6 0.9 0.6],...
x10, y10, [0.2 0.7 0.2],...	x16, y16, [0.2 0.7 0.2],...
s1x10, s1y10, [0.3 0.75 0.3],...	s1x16, s1y16, [0.3 0.75 0.3],...
s2x10, s2y10, [0.4 0.8 0.4],...	s2x16, s2y16, [0.4 0.8 0.4],...
s3x10, s3y10, [0.5 0.85 0.5],...	s3x16, s3y16, [0.5 0.85 0.5],...
s4x10, s4y10, [0.6 0.9 0.6],...	s4x16, s4y16, [0.6 0.9 0.6],...
x11, y11, [0.2 0.7 0.2],...	x17, y17, [0.2 0.7 0.2],...
s1x11, s1y11, [0.3 0.75 0.3],...	s1x17, s1y17, [0.3 0.75 0.3],...
s2x11, s2y11, [0.4 0.8 0.4],...	s2x17, s2y17, [0.4 0.8 0.4],...
s3x11, s3y11, [0.5 0.85 0.5],...	s3x17, s3y17, [0.5 0.85 0.5],...
s4x11, s4y11, [0.6 0.9 0.6],...	s4x17, s4y17, [0.6 0.9 0.6],...
x12, y12, [0.2 0.7 0.2],...	x18, y18, [0.2 0.7 0.2],...
s1x12, s1y12, [0.3 0.75 0.3],...	s1x18, s1y18, [0.3 0.75 0.3],...
s2x12, s2y12, [0.4 0.8 0.4],...	s2x18, s2y18, [0.4 0.8 0.4],...
s3x12, s3y12, [0.5 0.85 0.5],...	s3x18, s3y18, [0.5 0.85 0.5],...
s4x12, s4y12, [0.6 0.9 0.6],...	s4x18, s4y18, [0.6 0.9 0.6],...
x13, y13, [0.2 0.7 0.2],...	x19, y19, [0.2 0.7 0.2],...

s1x19, s1y19, [0.3 0.75
0.3],...
s2x19, s2y19, [0.4 0.8
0.4],...
s3x19, s3y19, [0.5 0.85
0.5],...
s4x19, s4y19, [0.6 0.9
0.6],...
x20, y20, [0.2 0.7
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0.5],...
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0.6],...
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0.6],...
wx1, wy1, [0.8 0 0],...
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wx6, wy6, [0.8 0 0],...
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s3wx6, s3wy6, [1 0.7
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wx8, wy8, [0.8 0 0],...
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0.4],...
s3wx10, s3wy10, [1 0.7
0.7],...
wx11, wy11, [0.8 0 0],...
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s2wx11, s2wy11, [1 0.4
0.4],...
s3wx11, s3wy11, [1 0.7
0.7],...
wx12, wy12, [0.8 0 0],...
s1wx12, s1wy12, [0.9 0.2
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s2wx12, s2wy12, [1 0.4
0.4],...
s3wx12, s3wy12, [1 0.7
0.7],...
wx13, wy13, [0.8 0 0],...
s1wx13, s1wy13, [0.9 0.2
0.2],...
s2wx13, s2wy13, [1 0.4
0.4],...
s3wx13, s3wy13, [1 0.7
0.7],...


```

if (stam==1)
cc=stam;
while (cc==1)
cc=stam;
pause(ryte);
if (status==1)
return
end
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
tt = tol-t;

m = fix(t/T);
m1=fix(tt/T);

% lo tmhma kinisis
if (m*T<=t) & (t<m*T+t11)
xx1 =x1+v*(t-m*T);
s1xx1 =s1x1+v*(t-m*T);

s2xx1 =s2x1+v*(t-m*T);
s3xx1 =s3x1+v*(t-m*T);
s4xx1 =s4x1+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t21)
xx2 =x2+v*(t-m*T);
s1xx2 =s1x2+v*(t-m*T);
s2xx2 =s2x2+v*(t-m*T);
s3xx2 =s3x2+v*(t-m*T);
s4xx2 =s4x2+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t31)
xx3 =x3+v*(t-m*T);
s1xx3 =s1x3+v*(t-m*T);
s2xx3 =s2x3+v*(t-m*T);
s3xx3 =s3x3+v*(t-m*T);
s4xx3 =s4x3+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t41)
xx4 =x4+v*(t-m*T);
s1xx4 =s1x4+v*(t-m*T);
s2xx4 =s2x4+v*(t-m*T);
s3xx4 =s3x4+v*(t-m*T);
s4xx4 =s4x4+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t51)
xx5 =x5+v*(t-m*T);
s1xx5 =s1x5+v*(t-m*T);
s2xx5 =s2x5+v*(t-m*T);
s3xx5 =s3x5+v*(t-m*T);
s4xx5 =s4x5+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t61)
xx6 =x6+v*(t-m*T);
s1xx6 =s1x6+v*(t-m*T);
s2xx6 =s2x6+v*(t-m*T);
s3xx6 =s3x6+v*(t-m*T);
s4xx6 =s4x6+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t71)
xx7 =x7+v*(t-m*T);
s1xx7 =s1x7+v*(t-m*T);
s2xx7 =s2x7+v*(t-m*T);
s3xx7 =s3x7+v*(t-m*T);
s4xx7 =s4x7+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t81)
xx8 =x8+v*(t-m*T);
s1xx8 =s1x8+v*(t-m*T);
s2xx8 =s2x8+v*(t-m*T);
s3xx8 =s3x8+v*(t-m*T);
s4xx8 =s4x8+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t91)
xx9 =x9+v*(t-m*T);
s1xx9 =s1x9+v*(t-m*T);
s2xx9 =s2x9+v*(t-m*T);
s3xx9 =s3x9+v*(t-m*T);
s4xx9 =s4x9+v*(t-m*T);

```

```

else
end

if (m*T<=t) & (t<m*T+t101)
xx10 =x10+v*(t-m*T);
s1xx10 =s1x10+v*(t-m*T);
s2xx10 =s2x10+v*(t-m*T);
s3xx10 =s3x10+v*(t-m*T);
s4xx10 =s4x10+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t111)
xx11 =x11+v*(t-m*T);
s1xx11 =s1x11+v*(t-m*T);
s2xx11 =s2x11+v*(t-m*T);
s3xx11 =s3x11+v*(t-m*T);
s4xx11 =s4x11+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t121)
xx12 =x12+v*(t-m*T);
s1xx12 =s1x12+v*(t-m*T);
s2xx12 =s2x12+v*(t-m*T);
s3xx12 =s3x12+v*(t-m*T);
s4xx12 =s4x12+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t131)
xx13 =x13+v*(t-m*T);
s1xx13 =s1x13+v*(t-m*T);
s2xx13 =s2x13+v*(t-m*T);
s3xx13 =s3x13+v*(t-m*T);
s4xx13 =s4x13+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t141)
xx14 =x14+v*(t-m*T);
s1xx14 =s1x14+v*(t-m*T);
s2xx14 =s2x14+v*(t-m*T);
s3xx14 =s3x14+v*(t-m*T);
s4xx14 =s4x14+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t151)
xx15 =x15+v*(t-m*T);
s1xx15 =s1x15+v*(t-m*T);
s2xx15 =s2x15+v*(t-m*T);
s3xx15 =s3x15+v*(t-m*T);
s4xx15 =s4x15+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t161)
xx16 =x16+v*(t-m*T);
s1xx16 =s1x16+v*(t-m*T);
s2xx16 =s2x16+v*(t-m*T);
s3xx16 =s3x16+v*(t-m*T);
s4xx16 =s4x16+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t171)
xx17 =x17+v*(t-m*T);
s1xx17 =s1x17+v*(t-m*T);
s2xx17 =s2x17+v*(t-m*T);
s3xx17 =s3x17+v*(t-m*T);
s4xx17 =s4x17+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t181)
xx18 =x18+v*(t-m*T);
s1xx18 =s1x18+v*(t-m*T);
s2xx18 =s2x18+v*(t-m*T);
s3xx18 =s3x18+v*(t-m*T);
s4xx18 =s4x18+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t191)
xx19 =x19+v*(t-m*T);
s1xx19 =s1x19+v*(t-m*T);
s2xx19 =s2x19+v*(t-m*T);
s3xx19 =s3x19+v*(t-m*T);
s4xx19 =s4x19+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t201)
xx20 =x20+v*(t-m*T);
s1xx20 =s1x20+v*(t-m*T);
s2xx20 =s2x20+v*(t-m*T);
s3xx20 =s3x20+v*(t-m*T);
s4xx20 =s4x20+v*(t-m*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t11)
xxx1 =wx1+v*(tt-m1*T);
s1xxx1 =s1wx1+v*(tt-
m1*T);
s2xxx1 =s2wx1+v*(tt-
m1*T);
s3xxx1 =s3wx1+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t21)
xxx2 =wx2+v*(tt-m1*T);

```



```
s1xxx2 =s1wx2+v*(tt-
m1*T);
s2xxx2 =s2wx2+v*(tt-
m1*T);
s3xxx2 =s3wx2+v*(tt-
m1*T);
else
end
%
if
(m1*T<=tt)&(tt<m1*T+t31)
xxx3 =wx3+v*(tt-m1*T);
s1xxx3 =s1wx3+v*(tt-
m1*T);
s2xxx3 =s2wx3+v*(tt-
m1*T);
s3xxx3 =s3wx3+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t41)
xxx4 =wx4+v*(tt-m1*T);
s1xxx4 =s1wx4+v*(tt-
m1*T);
s2xxx4 =s2wx4+v*(tt-
m1*T);
s3xxx4 =s3wx4+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t51)
xxx5 =wx5+v*(tt-m1*T);
s1xxx5 =s1wx5+v*(tt-
m1*T);
s2xxx5 =s2wx5+v*(tt-
m1*T);
s3xxx5 =s3wx5+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t61)
xxx6 =wx6+v*(tt-m1*T);
s1xxx6=s1wx6+v*(tt-m1*T);
s2xxx6 =s2wx6+v*(tt-
m1*T);
s3xxx6 =s3wx6+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t71)
xxx7 =wx7+v*(tt-m1*T);
s1xxx7 =s1wx7+v*(tt-
m1*T);
s2xxx7 =s2wx7+v*(tt-
m1*T);
s3xxx7 =s3wx7+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t81)
xxx8 =wx8+v*(tt-m1*T);
s1xxx8 =s1wx8+v*(tt-
m1*T);
s2xxx8 =s2wx8+v*(tt-
m1*T);
s3xxx8 =s3wx8+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t91)
xxx9 =wx9+v*(tt-m1*T);
s1xxx9 =s1wx9+v*(tt-
m1*T);
s2xxx9 =s2wx9+v*(tt-
m1*T);
s3xxx9=s3wx9+v*(tt-m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t101)
xxx10 =wx10+v*(tt-m1*T);
s1xxx10 =s1wx10+v*(tt-
m1*T);
s2xxx10 =s2wx10+v*(tt-
m1*T);
s3xxx10 =s3wx10+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t111)
xxx11 =wx11+v*(tt-m1*T);
s1xxx11 =s1wx11+v*(tt-
m1*T);
s2xxx11 =s2wx11+v*(tt-
m1*T);
s3xxx11 =s3wx11+v*(tt-
m1*T);
else
end

if
(m1*T<=tt)&(tt<m1*T+t121)
```

```

xxx12 =wx12+v*(tt-m1*T);
s1xxx12 =s1wx12+v*(tt-
m1*T);
s2xxx12 =s2wx12+v*(tt-
m1*T);
s3xxx12 =s3wx12+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t131)
xxx13 =wx13+v*(tt-m1*T);
s1xxx13 =s1wx13+v*(tt-
m1*T);
s2xxx13 =s2wx13+v*(tt-
m1*T);
s3xxx13 =s3wx13+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t141)
xxx14 =wx14+v*(tt-m1*T);
s1xxx14 =s1wx14+v*(tt-
m1*T);
s2xxx14 =s2wx14+v*(tt-
m1*T);
s3xxx14 =s3wx14+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t151)
xxx15 =wx15+v*(tt-m1*T);
s1xxx15 =s1wx15+v*(tt-
m1*T);
s2xxx15 =s2wx15+v*(tt-
m1*T);
s3xxx15 =s3wx15+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t161)
xxx16 =wx16+v*(tt-m1*T);
s1xxx16 =s1wx16+v*(tt-
m1*T);
s2xxx16 =s2wx16+v*(tt-
m1*T);

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%

%      % 2o tmhma kinisis
%

s3xxx16 =s3wx16+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t171)
xxx17 =wx17+v*(tt-m1*T);
s1xxx17 =s1wx17+v*(tt-
m1*T);
s2xxx17 =s2wx17+v*(tt-
m1*T);
s3xxx17 =s3wx17+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t181)
xxx18 =wx18+v*(tt-m1*T);
s1xxx18 =s1wx18+v*(tt-
m1*T);
s2xxx18 =s2wx18+v*(tt-
m1*T);
s3xxx18 =s3wx18+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t191)
xxx19 =wx19+v*(tt-m1*T);
s1xxx19 =s1wx19+v*(tt-
m1*T);
s2xxx19 =s2wx19+v*(tt-
m1*T);
s3xxx19 =s3wx19+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t201)
xxx20 =wx20+v*(tt-m1*T);
s1xxx20 =s1wx20+v*(tt-
m1*T);
s2xxx20 =s2wx20+v*(tt-
m1*T);
s3xxx20 =s3wx20+v*(tt-
m1*T);
else
end

if
(m*T+t11<=t) & (t<m*T+t11+t
12)
xx1 =x00+2+v*(t-t11-m*T);
s1xx1 =s1x00+2+v*(t-t11-
m*T);

```

```
s2xx1 =s2x00+2+v*(t-t11-
m*T);
s3xx1 =s3x00+2+v*(t-t11-
m*T);
s4xx1 =s4x00+2+v*(t-t11-
m*T);
else
end
```

```
if
(m*T+t21<=t) & (t<m*T+t21+t
22)
xx2 =x00+2+v*(t-t21-m*T);
s1xx2 =s1x00+2+v*(t-t21-
m*T);
s2xx2 =s2x00+2+v*(t-t21-
m*T);
s3xx2 =s3x00+2+v*(t-t21-
m*T);
s4xx2 =s4x00+2+v*(t-t21-
m*T);
else
end
```

```
if
(m*T+t31<=t) & (t<m*T+t31+t
32)
xx3 =x00+2+v*(t-t31-m*T);
s1xx3 =s1x00+2+v*(t-t31-
m*T);
s2xx3 =s2x00+2+v*(t-t31-
m*T);
s3xx3 =s3x00+2+v*(t-t31-
m*T);
s4xx3 =s4x00+2+v*(t-t31-
m*T);
else
end
```

```
if
(m*T+t41<=t) & (t<m*T+t41+t
42)
xx4 =x00+2+v*(t-t41-m*T);
s1xx4 =s1x00+2+v*(t-t41-
m*T);
s2xx4 =s2x00+2+v*(t-t41-
m*T);
s3xx4 =s3x00+2+v*(t-t41-
m*T);
s4xx4 =s4x00+2+v*(t-t41-
m*T);
else
end
```

```
if
(m*T+t51<=t) & (t<m*T+t51+t
52)
xx5 =x00+2+v*(t-t51-m*T);
```

```
s1xx5 =s1x00+2+v*(t-t51-
m*T);
s2xx5 =s2x00+2+v*(t-t51-
m*T);
s3xx5 =s3x00+2+v*(t-t51-
m*T);
s4xx5 =s4x00+2+v*(t-t51-
m*T);
else
end
```

```
if
(m*T+t61<=t) & (t<m*T+t61+t
62)
xx6 =x00+2+v*(t-t61-m*T);
s1xx6 =s1x00+2+v*(t-t61-
m*T);
s2xx6 =s2x00+2+v*(t-t61-
m*T);
s3xx6 =s3x00+2+v*(t-t61-
m*T);
s4xx6 =s4x00+2+v*(t-t61-
m*T);
else
end
```

```
if
(m*T+t71<=t) & (t<m*T+t71+t
72)
xx7 =x00+2+v*(t-t71-m*T);
s1xx7 =s1x00+2+v*(t-t71-
m*T);
s2xx7 =s2x00+2+v*(t-t71-
m*T);
s3xx7 =s3x00+2+v*(t-t71-
m*T);
s4xx7 =s4x00+2+v*(t-t71-
m*T);
else
end
```

```
if
(m*T+t81<=t) & (t<m*T+t81+t
82)
xx8 =x00+2+v*(t-t81-m*T);
s1xx8 =s1x00+2+v*(t-t81-
m*T);
s2xx8 =s2x00+2+v*(t-t81-
m*T);
s3xx8 =s3x00+2+v*(t-t81-
m*T);
s4xx8 =s4x00+2+v*(t-t81-
m*T);
else
end
```

```

if
(m*T+t91<=t) & (t<m*T+t91+t
92)
xx9 =x00+2+v*(t-t91-m*T);
s1xx9 =s1x00+2+v*(t-t91-
m*T);
s2xx9 =s2x00+2+v*(t-t91-
m*T);
s3xx9 =s3x00+2+v*(t-t91-
m*T);
s4xx9 =s4x00+2+v*(t-t91-
m*T);
else
end

```

```

if
(m*T+t101<=t) & (t<m*T+t101
+t102)
xx10 =x00+2+v*(t-t101-
m*T);
s1xx10 =s1x00+2+v*(t-
t101-m*T);
s2xx10 =s2x00+2+v*(t-
t101-m*T);
s3xx10 =s3x00+2+v*(t-
t101-m*T);
s4xx10 =s4x00+2+v*(t-
t101-m*T);
else
end

```

```

if
(m*T+t111<=t) & (t<m*T+t111
+t112)
xx11 =x00+2+v*(t-t111-
m*T);
s1xx11 =s1x00+2+v*(t-
t111-m*T);
s2xx11 =s2x00+2+v*(t-
t111-m*T);
s3xx11 =s3x00+2+v*(t-
t111-m*T);
s4xx11 =s4x00+2+v*(t-
t111-m*T);
else
end

```

```

if
(m*T+t121<=t) & (t<m*T+t121
+t122)
xx12 =x00+2+v*(t-t121-
m*T);
s1xx12 =s1x00+2+v*(t-
t121-m*T);
s2xx12 =s2x00+2+v*(t-
t121-m*T);
s3xx12 =s3x00+2+v*(t-
t121-m*T);

```

```

s4xx12 =s4x00+2+v*(t-
t121-m*T);
else
end

```

```

if
(m*T+t131<=t) & (t<m*T+t131
+t132)
xx13 =x00+2+v*(t-t131-
m*T);
s1xx13 =s1x00+2+v*(t-
t131-m*T);
s2xx13 =s2x00+2+v*(t-
t131-m*T);
s3xx13 =s3x00+2+v*(t-
t131-m*T);
s4xx13 =s4x00+2+v*(t-
t131-m*T);
else
end

```

```

if
(m*T+t141<=t) & (t<m*T+t141
+t142)
xx14 =x00+2+v*(t-t141-
m*T);
s1xx14 =s1x00+2+v*(t-
t141-m*T);
s2xx14 =s2x00+2+v*(t-
t141-m*T);
s3xx14 =s3x00+2+v*(t-
t141-m*T);
s4xx14 =s4x00+2+v*(t-
t141-m*T);
else
end

```

```

if
(m*T+t151<=t) & (t<m*T+t151
+t152)
xx15 =x00+2+v*(t-t151-
m*T);
s1xx15 =s1x00+2+v*(t-
t151-m*T);
s2xx15 =s2x00+2+v*(t-
t151-m*T);
s3xx15 =s3x00+2+v*(t-
t151-m*T);
s4xx15 =s4x00+2+v*(t-
t151-m*T);
else
end

```

```

if
(m*T+t161<=t) & (t<m*T+t161
+t162)
xx16 =x00+2+v*(t-t161-
m*T);
s1xx16 =s1x00+2+v*(t-
t161-m*T);

```

```

s2xx16 =s2x00+2+v*(t-
t161-m*T);
s3xx16 =s3x00+2+v*(t-
t161-m*T);
s4xx16 =s4x00+2+v*(t-
t161-m*T);
ex16=2+v*(t-t161-m*T);
else
end

if
(m*T+t171<=t) & (t<m*T+t171
+t172)
xx17 =x00+2+v*(t-t171-
m*T);
s1xx17 =s1x00+2+v*(t-
t171-m*T);
s2xx17 =s2x00+2+v*(t-
t171-m*T);
s3xx17 =s3x00+2+v*(t-
t171-m*T);
s4xx17 =s4x00+2+v*(t-
t171-m*T);
else
end

if
(m*T+t181<=t) & (t<m*T+t181
+t182)
xx18 =x00+2+v*(t-t181-
m*T);
s1xx18 =s1x00+2+v*(t-
t181-m*T);
s2xx18 =s2x00+2+v*(t-
t181-m*T);
s3xx18 =s3x00+2+v*(t-
t181-m*T);
s4xx18 =s4x00+2+v*(t-
t181-m*T);
else
end

if
(m*T+t191<=t) & (t<m*T+t191
+t192)
xx19 =x00+2+v*(t-t191-
m*T);
s1xx19 =s1x00+2+v*(t-
t191-m*T);
s2xx19 =s2x00+2+v*(t-
t191-m*T);
s3xx19 =s3x00+2+v*(t-
t191-m*T);
s4xx19 =s4x00+2+v*(t-
t191-m*T);
else
end

```

```

if
(m*T+t201<=t) & (t<m*T+t201
+t202)
xx20 =x00+2+v*(t-t201-
m*T);
s1xx20 =s1x00+2+v*(t-
t201-m*T);
s2xx20 =s2x00+2+v*(t-
t201-m*T);
s3xx20 =s3x00+2+v*(t-
t201-m*T);
s4xx20 =s4x00+2+v*(t-
t201-m*T);
else
end

if
(m1*T+t11<=tt) & (tt<m1*T+t
11+t12)
xxx1 =wx00+2+v*(tt-t11-
m1*T);
s1xxx1 =s1wx00+2+v*(tt-
t11-m1*T);
s2xxx1 =s2wx00+2+v*(tt-
t11-m1*T);
s3xxx1 =s3wx00+2+v*(tt-
t11-m1*T);
else
end

if
(m1*T+t21<=tt) & (tt<m1*T+t
21+t22)
xxx2 =wx00+2+v*(tt-t21-
m1*T);
s1xxx2 =s1wx00+2+v*(tt-
t21-m1*T);
s2xxx2 =s2wx00+2+v*(tt-
t21-m1*T);
s3xxx2 =s3wx00+2+v*(tt-
t21-m1*T);
else
end

if
(m1*T+t31<=tt) & (tt<m1*T+t
31+t32)
xxx3 =wx00+2+v*(tt-t31-
m1*T);
s1xxx3 =s1wx00+2+v*(tt-
t31-m1*T);
s2xxx3 =s2wx00+2+v*(tt-
t31-m1*T);
s3xxx3 =s3wx00+2+v*(tt-
t31-m1*T);
else
end

```

```
if
(m1*T+t41<=tt) & (tt<m1*T+t
41+t42)
xxx4 =wx00+2+v*(tt-t41-
m1*T);
s1xxx4 =s1wx00+2+v*(tt-
t41-m1*T);
s2xxx4 =s2wx00+2+v*(tt-
t41-m1*T);
s3xxx4 =s3wx00+2+v*(tt-
t41-m1*T);
else
end

if
(m1*T+t51<=tt) & (tt<m1*T+t
51+t52)
xxx5 =wx00+2+v*(tt-t51-
m1*T);
s1xxx5 =s1wx00+2+v*(tt-
t51-m1*T);
s2xxx5 =s2wx00+2+v*(tt-
t51-m1*T);
s3xxx5 =s3wx00+2+v*(tt-
t51-m1*T);
else
end

if
(m1*T+t61<=tt) & (tt<m1*T+t
61+t62)
xxx6 =wx00+2+v*(tt-t61-
m1*T);
s1xxx6 =s1wx00+2+v*(tt-
t61-m1*T);
s2xxx6 =s2wx00+2+v*(tt-
t61-m1*T);
s3xxx6 =s3wx00+2+v*(tt-
t61-m1*T);
else
end

if
(m1*T+t71<=tt) & (tt<m1*T+t
71+t72)
xxx7 =wx00+2+v*(tt-t71-
m1*T);
s1xxx7 =s1wx00+2+v*(tt-
t71-m1*T);
s2xxx7 =s2wx00+2+v*(tt-
t71-m1*T);
s3xxx7 =s3wx00+2+v*(tt-
t71-m1*T);
else
end

if
(m1*T+t81<=tt) & (tt<m1*T+t
81+t82)
xxx8 =wx00+2+v*(tt-t81-
m1*T);
s1xxx8 =s1wx00+2+v*(tt-
t81-m1*T);
s2xxx8 =s2wx00+2+v*(tt-
t81-m1*T);
s3xxx8 =s3wx00+2+v*(tt-
t81-m1*T);
else
end

if
(m1*T+t91<=tt) & (tt<m1*T+t
91+t92)
xxx9 =wx00+2+v*(tt-t91-
m1*T);
s1xxx9 =s1wx00+2+v*(tt-
t91-m1*T);
s2xxx9 =s2wx00+2+v*(tt-
t91-m1*T);
s3xxx9 =s3wx00+2+v*(tt-
t91-m1*T);
else
end

if
(m1*T+t101<=tt) & (tt<m1*T+
t101+t102)
xxx10 =wx00+2+v*(tt-t101-
m1*T);
s1xxx10 =s1wx00+2+v*(tt-
t101-m1*T);
s2xxx10 =s2wx00+2+v*(tt-
t101-m1*T);
s3xxx10 =s3wx00+2+v*(tt-
t101-m1*T);
else
end

if
(m1*T+t111<=tt) & (tt<m1*T+
t111+t112)
xxx11 =wx00+2+v*(tt-t111-
m1*T);
s1xxx11 =s1wx00+2+v*(tt-
t111-m1*T);
s2xxx11 =s2wx00+2+v*(tt-
t111-m1*T);
s3xxx11 =s3wx00+2+v*(tt-
t111-m1*T);
else
end

if
(m1*T+t121<=tt) & (tt<m1*T+
t121+t122)
xxx12 =wx00+2+v*(tt-t121-
m1*T);
s1xxx12 =s1wx00+2+v*(tt-
t121-m1*T);
```

```

s2xxx12 =s2wx00+2+v*(tt-
t121-m1*T);
s3xxx12 =s3wx00+2+v*(tt-
t121-m1*T);
else
end

if
(m1*T+t131<=tt)&(tt<m1*T+
t131+t132)
xxx13 =wx00+2+v*(tt-t131-
m1*T);
s1xxx13 =s1wx00+2+v*(tt-
t131-m1*T);
s2xxx13 =s2wx00+2+v*(tt-
t131-m1*T);
s3xxx13 =s3wx00+2+v*(tt-
t131-m1*T);
else
end

if
(m1*T+t141<=tt)&(tt<m1*T+
t141+t142)
xxx14 =wx00+2+v*(tt-t141-
m1*T);
s1xxx14 =s1wx00+2+v*(tt-
t141-m1*T);
s2xxx14 =s2wx00+2+v*(tt-
t141-m1*T);
s3xxx14 =s3wx00+2+v*(tt-
t141-m1*T);
else
end

if
(m1*T+t151<=tt)&(tt<m1*T+
t151+t152)
xxx15 =wx00+2+v*(t-t151-
m1*T);
s1xxx15 =s1wx00+2+v*(tt-
t151-m1*T);
s2xxx15 =s2wx00+2+v*(tt-
t151-m1*T);
s3xxx15 =s3wx00+2+v*(tt-
t151-m1*T);
else
end

if
(m1*T+t161<=tt)&(tt<m1*T+
t161+t162)
xxx16 =wx00+2+v*(tt-t161-
m1*T);
s1xxx16 =s1wx00+2+v*(tt-
t161-m1*T);
s2xxx16 =s2wx00+2+v*(tt-
t161-m1*T);
s3xxx16 =s3wx00+2+v*(tt-
t161-m1*T);

else
end

if
(m1*T+t171<=tt)&(tt<m1*T+
t171+t172)
xxx17 =wx00+2+v*(tt-t171-
m1*T);
s1xxx17 =s1wx00+2+v*(tt-
t171-m1*T);
s2xxx17 =s2wx00+2+v*(tt-
t171-m1*T);
s3xxx17 =s3wx00+2+v*(tt-
t171-m1*T);
else
end

if
(m1*T+t181<=tt)&(tt<m1*T+
t181+t182)
xxx18 =wx00+2+v*(tt-t181-
m1*T);
s1xxx18 =s1wx00+2+v*(tt-
t181-m1*T);
s2xxx18 =s2wx00+2+v*(tt-
t181-m1*T);
s3xxx18 =s3wx00+2+v*(tt-
t181-m1*T);
else
end

if
(m1*T+t191<=tt)&(tt<m1*T+
t191+t192)
xxx19 =wx00+2+v*(tt-t191-
m1*T);
s1xxx19 =s1wx00+2+v*(tt-
t191-m1*T);
s2xxx19 =s2wx00+2+v*(tt-
t191-m1*T);
s3xxx19 =s3wx00+2+v*(tt-
t191-m1*T);
else
end

if
(m1*T+t201<=tt)&(tt<m1*T+
t201+t202)
xxx20 =wx00+2+v*(tt-t201-
m1*T);
s1xxx20 =s1wx00+2+v*(tt-
t201-m1*T);
s2xxx20 =s2wx00+2+v*(tt-
t201-m1*T);
s3xxx20 =s3wx00+2+v*(tt-
t201-m1*T);
else
end

```

```

% %
fill(ypovx, ypovy, [0.9
0.9 0.9] ,...
basx1, basy1, [0.76 0.36
0] ,...
basbx1, basby1, [0.6 0.2
0] ,...
bascx1, bascy1, [0.8 0.4
0] ,...
basx2, basy2, [0.76 0.36
0] ,...
basbx2, basby2, [0.6 0.2
0] ,...
bascx2, bascy2, [0.8 0.4
0] ,...
xx1, y1, [0.2 0.7
0.2],...
s1xx1, s1y1, [0.3 0.75
0.3],...
s2xx1, s2y1, [0.4 0.8
0.4],...
s3xx1, s3y1, [0.5 0.85
0.5],...
s4xx1, s4y1, [0.6 0.9
0.6],...
xxx1, wy1, [0.8 0 0],...
s1xxx1, s1wy1, [0.9 0.2
0.2],...
s2xxx1, s2wy1, [1 0.4
0.4],...
s3xxx1, s3wy1, [1 0.7
0.7],...
xx2, y2, [0.2 0.7
0.2],...
s1xx2, s1y2, [0.3 0.75
0.3],...
s2xx2, s2y2, [0.4 0.8
0.4],...
s3xx2, s3y2, [0.5 0.85
0.5],...
s4xx2, s4y2, [0.6 0.9
0.6],...
xxx2, wy2, [0.8 0 0],...
s1xxx2, s1wy2, [0.9 0.2
0.2],...
s2xxx2, s2wy2, [1 0.4
0.4],...
s3xxx2, s3wy2, [1 0.7
0.7],...
xx3, y3, [0.2 0.7
0.2],...
s1xx3, s1y3, [0.3 0.75
0.3],...
s2xx3, s2y3, [0.4 0.8
0.4],...
s3xx3, s3y3, [0.5 0.85
0.5],...
s4xx3, s4y3, [0.6 0.9
0.6],...
xxx3, wy3, [0.8 0 0],...
s1xxx3, s1wy3, [0.9 0.2
0.2],...
s2xxx3, s2wy3, [1 0.4
0.4],...
s3xxx3, s3wy3, [1 0.7
0.7],...
xx4, y4, [0.2 0.7
0.2],...
s1xx4, s1y4, [0.3 0.75
0.3],...
s2xx4, s2y4, [0.4 0.8
0.4],...
s3xx4, s3y4, [0.5 0.85
0.5],...
s4xx4, s4y4, [0.6 0.9
0.6],...
xxx4, wy4, [0.8 0 0],...
s1xxx4, s1wy4, [0.9 0.2
0.2],...
s2xxx4, s2wy4, [1 0.4
0.4],...
s3xxx4, s3wy4, [1 0.7
0.7],...
xx5, y5, [0.2 0.7
0.2],...
s1xx5, s1y5, [0.3 0.75
0.3],...
s2xx5, s2y5, [0.4 0.8
0.4],...
s3xx5, s3y5, [0.5 0.85
0.5],...
s4xx5, s4y5, [0.6 0.9
0.6],...
xxx5, wy5, [0.8 0 0],...
s1xxx5, s1wy5, [0.9 0.2
0.2],...
s2xxx5, s2wy5, [1 0.4
0.4],...
s3xxx5, s3wy5, [1 0.7
0.7],...
xx6, y6, [0.2 0.7
0.2],...
s1xx6, s1y6, [0.3 0.75
0.3],...
s2xx6, s2y6, [0.4 0.8
0.4],...
s3xx6, s3y6, [0.5 0.85
0.5],...
s4xx6, s4y6, [0.6 0.9
0.6],...
xxx6, wy6, [0.8 0 0],...
s1xxx6, s1wy6, [0.9 0.2
0.2],...
s2xxx6, s2wy6, [1 0.4
0.4],...
s3xxx6, s3wy6, [1 0.7
0.7],...
xx7, y7, [0.2 0.7
0.2],...

```



```

s1xx7, s1y7, [0.3 0.75
0.3],...
s2xx7, s2y7, [0.4 0.8
0.4],...
s3xx7, s3y7, [0.5 0.85
0.5],...
s4xx7, s4y7, [0.6 0.9
0.6],...
xxx7, wy7, [0.8 0 0],...
s1xxx7, s1wy7, [0.9 0.2
0.2],...
s2xxx7, s2wy7, [1 0.4
0.4],...
s3xxx7, s3wy7, [1 0.7
0.7],...
xx8, y8, [0.2 0.7
0.2],...
s1xx8, s1y8, [0.3 0.75
0.3],...
s2xx8, s2y8, [0.4 0.8
0.4],...
s3xx8, s3y8, [0.5 0.85
0.5],...
s4xx8, s4y8, [0.6 0.9
0.6],...
xxx8, wy8, [0.8 0 0],...
s1xxx8, s1wy8, [0.9 0.2
0.2],...
s2xxx8, s2wy8, [1 0.4
0.4],...
s3xxx8, s3wy8, [1 0.7
0.7],...
xx9, y9, [0.2 0.7
0.2],...
s1xx9, s1y9, [0.3 0.75
0.3],...
s2xx9, s2y9, [0.4 0.8
0.4],...
s3xx9, s3y9, [0.5 0.85
0.5],...
s4xx9, s4y9, [0.6 0.9
0.6],...
xxx9, wy9, [0.8 0 0],...
s1xxx9, s1wy9, [0.9 0.2
0.2],...
s2xxx9, s2wy9, [1 0.4
0.4],...
s3xxx9, s3wy9, [1 0.7
0.7],...
xx10, y10, [0.2 0.7
0.2],...
s1xx10, s1y10, [0.3
0.75 0.3],...
s2xx10, s2y10, [0.4 0.8
0.4],...
s3xx10, s3y10, [0.5
0.85 0.5],...
s4xx10, s4y10, [0.6 0.9
0.6],...
xxx10, wy10, [0.8 0
0],...
s1xxx10, s1wy10, [0.9 0.2
0.2],...
s2xxx10, s2wy10, [1 0.4
0.4],...
s3xxx10, s3wy10, [1 0.7
0.7],...
xx11, y11, [0.2 0.7
0.2],...
s1xx11, s1y11, [0.3
0.75 0.3],...
s2xx11, s2y11, [0.4 0.8
0.4],...
s3xx11, s3y11, [0.5
0.85 0.5],...
s4xx11, s4y11, [0.6 0.9
0.6],...
xxx11, wy11, [0.8 0
0],...
s1xxx11, s1wy11, [0.9 0.2
0.2],...
s2xxx11, s2wy11, [1 0.4
0.4],...
s3xxx11, s3wy11, [1 0.7
0.7],...
xx12, y12, [0.2 0.7
0.2],...
s1xx12, s1y12, [0.3
0.75 0.3],...
s2xx12, s2y12, [0.4 0.8
0.4],...
s3xx12, s3y12, [0.5
0.85 0.5],...
s4xx12, s4y12, [0.6 0.9
0.6],...
xxx12, wy12, [0.8 0
0],...
s1xxx12, s1wy12, [0.9 0.2
0.2],...
s2xxx12, s2wy12, [1 0.4
0.4],...
s3xxx12, s3wy12, [1 0.7
0.7],...
xx13, y13, [0.2 0.7
0.2],...
s1xx13, s1y13, [0.3
0.75 0.3],...
s2xx13, s2y13, [0.4 0.8
0.4],...
s3xx13, s3y13, [0.5
0.85 0.5],...
s4xx13, s4y13, [0.6 0.9
0.6],...
xxx13, wy13, [0.8 0
0],...
s1xxx13, s1wy13, [0.9 0.2
0.2],...
s2xxx13, s2wy13, [1 0.4
0.4],...

```

s3xxx13, s3wy13, [1 0.7
 0.7],...
 xx14, y14, [0.2 0.7
 0.2],...
 s1xx14, s1y14, [0.3
 0.75 0.3],...
 s2xx14, s2y14, [0.4 0.8
 0.4],...
 s3xx14, s3y14, [0.5
 0.85 0.5],...
 s4xx14, s4y14, [0.6 0.9
 0.6],...
 xxx14, wy14, [0.8 0
 0],...
 s1xxx14, s1wy14, [0.9 0.2
 0.2],...
 s2xxx14, s2wy14, [1 0.4
 0.4],...
 s3xxx14, s3wy14, [1 0.7
 0.7],...
 xx15, y15, [0.2 0.7
 0.2],...
 s1xx15, s1y15, [0.3
 0.75 0.3],...
 s2xx15, s2y15, [0.4 0.8
 0.4],...
 s3xx15, s3y15, [0.5
 0.85 0.5],...
 s4xx15, s4y15, [0.6 0.9
 0.6],...
 xxx15, wy15, [0.8 0
 0],...
 s1xxx15, s1wy15, [0.9 0.2
 0.2],...
 s2xxx15, s2wy15, [1 0.4
 0.4],...
 s3xxx15, s3wy15, [1 0.7
 0.7],...
 xx16, y16, [0.2 0.7
 0.2],...
 s1xx16, s1y16, [0.3
 0.75 0.3],...
 s2xx16, s2y16, [0.4 0.8
 0.4],...
 s3xx16, s3y16, [0.5
 0.85 0.5],...
 s4xx16, s4y16, [0.6 0.9
 0.6],...
 xxx16, wy16, [0.8 0
 0],...
 s1xxx16, s1wy16, [0.9 0.2
 0.2],...
 s2xxx16, s2wy16, [1 0.4
 0.4],...
 s3xxx16, s3wy16, [1 0.7
 0.7],...
 xx17, y17, [0.2 0.7
 0.2],...
 s1xx17, s1y17, [0.3
 0.75 0.3],...
 s2xx17, s2y17, [0.4 0.8
 0.4],...
 s3xx17, s3y17, [0.5
 0.85 0.5],...
 s4xx17, s4y17, [0.6 0.9
 0.6],...
 xxx17, wy17, [0.8 0
 0],...
 s1xxx17, s1wy17, [0.9 0.2
 0.2],...
 s2xxx17, s2wy17, [1 0.4
 0.4],...
 s3xxx17, s3wy17, [1 0.7
 0.7],...
 xx18, y18, [0.2 0.7
 0.2],...
 s1xx18, s1y18, [0.3
 0.75 0.3],...
 s2xx18, s2y18, [0.4 0.8
 0.4],...
 s3xx18, s3y18, [0.5
 0.85 0.5],...
 s4xx18, s4y18, [0.6 0.9
 0.6],...
 xxx18, wy18, [0.8 0
 0],...
 s1xxx18, s1wy18, [0.9 0.2
 0.2],...
 s2xxx18, s2wy18, [1 0.4
 0.4],...
 s3xxx18, s3wy18, [1 0.7
 0.7],...
 xxx19, wy19, [0.8 0
 0],...
 s1xxx19, s1wy19, [0.9 0.2
 0.2],...
 s2xxx19, s2wy19, [1 0.4
 0.4],...
 s3xxx19, s3wy19, [1 0.7
 0.7],...
 xx19, y19, [0.2 0.7
 0.2],...
 s1xx19, s1y19, [0.3
 0.75 0.3],...
 s2xx19, s2y19, [0.4 0.8
 0.4],...
 s3xx19, s3y19, [0.5
 0.85 0.5],...
 s4xx19, s4y19, [0.6 0.9
 0.6],...
 xxx20, wy20, [0.8 0
 0],...
 s1xxx20, s1wy20, [0.9 0.2
 0.2],...
 s2xxx20, s2wy20, [1 0.4
 0.4],...
 s3xxx20, s3wy20, [1 0.7
 0.7],...
 xx20, y20, [0.2 0.7
 0.2],...

```

s1xx20, s1y20, [0.3
0.75 0.3],...
s2xx20, s2y20, [0.4 0.8
0.4],...
s3xx20, s3y20, [0.5
0.85 0.5],...
s4xx20, s4y20, [0.6 0.9
0.6],...
xc1, yc1, [0.2 0.7
0.2],...
s1xc1, s1yc1, [0.3 0.75
0.3],...
s2xc1, s2yc1, [0.4 0.8
0.4],...

s3xc1, s3yc1, [0.5 0.85
0.5],...
s4xc1, s4yc1, [0.6 0.9
0.6],...
xna, yna, [0.8 0 0],...
s1xna, s1yna, [0.9 0.2
0.2],...
s2xna, s2yna, [1 0.4
0.4],...
s3xna, s3yna, [1 0.7
0.7],...
'LineStyle', 'none')
axis([1.7 3.2 0.75
2.5]);

axis off
text(2.1 , 0.97, 'Παρατηρούμε την κίνηση ιόντων σε διάλυμα
χλωριούχου νατρίου', 'FontSize', 9)
text(2.1 , 0.9, 'Τα θετικά ιόντα του Na έλκονται από την
κάθοδο', 'FontSize', 9)
text(2.1 , 0.83, 'Τα αρνητικά ιόντα του Cl έλκονται από την
άνοδο', 'FontSize', 9)

text(1.9 , 2.35, '+', 'FontSize', 20)
text(1.85 , 2.27, 'ΑΝΟΔΟΣ', 'FontSize', 12)
text(2.95 , 2.35, '-', 'FontSize', 22)
text(2.85 , 2.27, 'ΚΑΘΟΔΟΣ', 'FontSize', 12)

text(2.4 , 2.3, 'Na', 'FontSize', 12)
text(2.4 , 2.405, 'Cl', 'FontSize', 12)

text(2.45 , 2.315, '+', 'FontSize', 10)
text(2.45 , 2.43, '-', 'FontSize', 16)
pause(ryte)
end

set(handles.pushbutton5, 'enable', 'on')
set(handles.pushbutton6, 'enable', 'on')

% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton3 (see GCBO)
% eventdata reserved - to be defined in a future version of
MATLAB
% handles structure with handles and user data (see GUIDATA)
global stam;

if (stam==0)
set(handles.pushbutton3, 'string', 'Συνέχεια')
set(handles.pushbutton5, 'enable', 'on')
set(handles.pushbutton6, 'enable', 'on')
stam=1;
elseif (stam==1)
set(handles.pushbutton3, 'string', 'Διακοπή')
set(handles.pushbutton5, 'enable', 'off')
set(handles.pushbutton6, 'enable', 'off')
stam=0;

```

```
else
end
guidata(hObject, handles);

% % --- Executes on button press in pushbutton4.
% function pushbutton4_Callback(hObject, eventdata, handles)
% % hObject    handle to pushbutton4 (see GCBO)
% % eventdata  reserved - to be defined in a future version of
MATLAB
% % handles    structure with handles and user data (see
GUIDATA)
% global suv;
% global stam;
% suv=get(handles.pushbutton4,'value');
% stam=0;

% --- Executes on button press in pushbutton5.
function pushbutton5_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton5 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
global ryt;
global status;
status=1;
axes(handles.axes1)
cla
clear ryt;
set(handles.edit1,'enable','on','string','5');
set(handles.pushbutton2,'enable','on')
guidata(hObject, handles);

% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton6 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
global status;
global stam;
hfin=questdlg('Εξοδος από το πρόγραμμα;');
switch hfin
case 'Yes'
stam=1;
status=1;
closereq;
end

% --- Executes on button press in pushbutton7.
function pushbutton7_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton7 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
! help_eik_3_15b.pdf;
```

- **Gfig_3_18.m**

```
function varargout = gfig_3_18(varargin)
% GFIG_3_18 M-file for gfig_3_18.fig
%     GFIG_3_18, by itself, creates a new GFIG_3_18 or raises
the existing
%     singleton*.
%
%     H = GFIG_3_18 returns the handle to a new GFIG_3_18 or
the handle to
%     the existing singleton*.
%
%     GFIG_3_18('CALLBACK', hObject,eventData,handles,...)
calls the local
%     function named CALLBACK in GFIG_3_18.M with the given
input arguments.
%
%     GFIG_3_18('Property','Value',...) creates a new
GFIG_3_18 or raises the
%     existing singleton*. Starting from the left, property
value pairs are
%     applied to the GUI before gfig_3_18_OpeningFcn gets
called. An
%     unrecognized property name or invalid value makes
property application
%     stop. All inputs are passed to gfig_3_18_OpeningFcn via
varargin.
%
%     *See GUI Options on GUIDE's Tools menu. Choose "GUI
allows only one
%     instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help gfig_3_18

% Last Modified by GUIDE v2.5 28-Oct-2011 11:30:16

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
'gui_Singleton',  gui_Singleton, ...
'gui_OpeningFcn', @gfig_3_18_OpeningFcn, ...
'gui_OutputFcn',  @gfig_3_18_OutputFcn, ...
'gui_LayoutFcn',  [] , ...
'gui_Callback',   []);
if nargin && ischar(varargin{1})
gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
[varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT
```

```
% --- Executes just before gfig_3_18 is made visible.
function gfig_3_18_OpeningFcn(hObject, eventdata, handles,
varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to gfig_3_18 (see VARARGIN)

% Choose default command line output for gfig_3_18
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes gfig_3_18 wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command
line.
function varargout = gfig_3_18_OutputFcn(hObject, eventdata,
handles)
% varargout  cell array for returning output args (see
VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

function edit1_Callback(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit1 as
text
%          str2double(get(hObject,'String')) returns contents of
edit1 as a double

% --- Executes during object creation, after setting all
properties.
function edit1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    empty - handles not created until after all
CreateFcns called
```

```

% Hint: edit controls usually have a white background on
Windows.
% See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in pushbutton1.
% function pushbutton1_Callback(hObject, eventdata, handles)
% % hObject handle to pushbutton1 (see GCBO)
% % eventdata reserved - to be defined in a future version of
MATLAB
% % handles structure with handles and user data (see
GUIDATA)
% global ryt;
% ryt=str2double(get(handles.edit1,'String'));

% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton2 (see GCBO)
% eventdata reserved - to be defined in a future version of
MATLAB
% handles structure with handles and user data (see GUIDATA)

global ryt;
ryt=str2double(get(handles.edit1,'String'));

global status;
global stam;
global suv;
axes(handles.axes1)
axis off;
set(handles.pushbutton3,'string','Διακοπή')
stam=0;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
stam=0;
suv=0;
status=0;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
set(handles.edit1,'enable','off');
set(handles.pushbutton2,'enable','off')
set(handles.pushbutton5,'enable','off')
set(handles.pushbutton6,'enable','off')

if ryt <0.001|ryt > 5
hfin=warndlg('Βάλτε στο Ρυθμό Προσομοίωσης τιμή μεταξύ 0.001
και 5');
return
else

```

```

end

ryte = -ryt+5+0.001;
% Taxythta hleltroniwn
v=1 ;

% AGWGOS
agx = [2 3 3 2];
agy = [1 1 2 2];

met1 = 0.7 ;
met2 = 0.7;

% Iodwn megisth thesi
basi = 3.0;

rax = 0.03;
ray = 0.5;
f=0:pi/20:2*pi;

f13=0:pi/50:2*pi;

metb1=0.05;
basx1 =[2 2.03 2.03 2]-
metb1;
basy1 = [1 1 2 2];

xcl= 2.35+rx*cos(f13);
ycl= 2.4+ry*sin(f13);
s1xcl=
2.35+0.9*rx*cos(f13);
s1ycl=
2.4+0.9*ry*sin(f13);
s2xcl=
2.35+0.6*rx*cos(f13);
s2ycl=
2.4+0.6*ry*sin(f13);
s3xcl=
2.35+0.3*rx*cos(f13);
s3ycl=
2.4+0.3*ry*sin(f13);
s4xcl=
2.35+0.2*rx*cos(f13);
s4ycl=
2.4+0.2*ry*sin(f13);

basbx1 =[2 1.95 1.95
2]-metb1;
basby1 = [1 1.2 2.2
2];

xna=
2.35+met1*rx*cos(f13);
yna=
2.3+met1*ry*sin(f13);
s1xna=
2.35+met1*0.9*rx*cos(f13
);
s1yna=
2.3+met1*0.9*ry*sin(f13)
;
s2xna=
2.35+met1*0.6*rx*cos(f13
);
s2yna=
2.3+met1*0.6*ry*sin(f13)
;
s3xna=
2.35+met1*0.2*rx*cos(f13
);
s3yna=
2.3+met1*0.2*ry*sin(f13)
;

bascx1 =[2 2.03 1.98
1.95]-metb1;
bascy1 = [2 2 2.2
2.2];

basx2 =basx1+metb2;
basx2 =basx1+metb2;
basby2 =basby1;

basx2 =basx1+metb2;
bascy2 =bascy1;

% basx3
=2.5+rax*cos(f);
% basy3 =basy1;

% YPOBATHRO
ypovx = [-0.5 4 4
-0.5];
ypovy = [-0.5 -0.5 3.5
3.5];

% HLEKTRONIA
f1 = 0:pi/5:2*pi;

rx=0.022;
ry=0.03;

```



```

% atomo xlwrio apo to
opoio prokryptoun ola ta
alla
x00 = rxe*cos(f1);
s1x00 = 0.9*rxe*cos(f1);
s2x00 = 0.6*rxe*cos(f1);
s3x00 = 0.3*rxe*cos(f1);
s4x00 = 0.2*rxe*cos(f1);
y00 = rxe*cos(f1);
s1y00 =
0.4*0.9*rxe*sin(f1);
s2y00 =
0.4*0.6*rxe*sin(f1);
s3y00 =
0.4*0.2*rxe*sin(f1);

% atomo natrio apo to
opoio prokryptoun ola ta
alla
wx00 = met1*rxe*cos(f1);
s1wx00 =
0.9*met1*rxe*cos(f1);
s2wx00 =
0.6*met1*rxe*cos(f1);
s3wx00 =
0.2*met1*rxe*cos(f1);

x01 = 2.3;
y01 = 1.5;
s1 = basi-x01;
t11 = s1/v;
t12 = (x01-2)/v;
T =t11+t12;

x1 =x01+rxe*cos(f1);
y1 =y01+rye*sin(f1);
s1x1
=x01+0.9*rxe*cos(f1);
s1y1
=y01+0.9*rye*sin(f1);
s2x1
=x01+0.6*rxe*cos(f1);
s2y1
=y01+0.6*rye*sin(f1);
s3x1
=x01+0.3*rxe*cos(f1);
s3y1
=y01+0.3*rye*sin(f1);
s4x1
=x01+0.2*rxe*cos(f1);
s4y1
=y01+0.2*rye*sin(f1);

wx1
=x01+met1*rxe*cos(f1);

wy1
=y01+met2*rye*sin(f1)-
0.18;
s1wx1
=x01+met1*0.9*rxe*cos(f1)
;
s1wy1
=y01+met2*0.9*rye*sin(f1)
-0.18;
s2wx1
=x01+met1*0.6*rxe*cos(f1)
;
s2wy1
=y01+met2*0.6*rye*sin(f1)
-0.18;
s3wx1
=x01+met1*0.2*rxe*cos(f1)
;
s3wy1
=y01+met2*0.2*rye*sin(f1)
-0.18;

x02 = 2.1;
y02 = 1.2;
s2 = basi-x02;
t21 = s2/v;
t22 = (x02-2)/v;
x2 =x02+rxe*cos(f1);
y2 =y02+rye*sin(f1);
s1x2
=x02+0.9*rxe*cos(f1);
s1y2
=y02+0.9*rye*sin(f1);
s2x2
=x02+0.6*rxe*cos(f1);
s2y2
=y02+0.6*rye*sin(f1);
s3x2
=x02+0.3*rxe*cos(f1);
s3y2
=y02+0.3*rye*sin(f1);
s4x2
=x02+0.2*rxe*cos(f1);
s4y2
=y02+0.2*rye*sin(f1);

wx2
=x02+met1*rxe*cos(f1);
wy2
=y02+met2*rye*sin(f1)-
0.11;
s1wx2
=x02+met1*0.9*rxe*cos(f1)
;
s1wy2
=y02+met2*0.9*rye*sin(f1)
-0.11;

```

```

s2wx2
=x02+met1*0.6*rxexcos(f1)
;
s2wy2
=y02+met2*0.6*ryesin(f1)
-0.11;
s3wx2
=x02+met1*0.2*rxexcos(f1)
;
s3wy2
=y02+met2*0.2*ryesin(f1)
-0.11;

x03 = 2.6;
y03 = 1.8;
s3 = basi-x03;
t31 = s3/v;
t32 = (x03-2)/v;
x3 =x03+rxexcos(f1);
y3 =y03+ryesin(f1);
s1x3
=x03+0.9*rxexcos(f1);
s1y3
=y03+0.9*ryesin(f1);
s2x3
=x03+0.6*rxexcos(f1);
s2y3
=y03+0.6*ryesin(f1);
s3x3
=x03+0.3*rxexcos(f1);
s3y3
=y03+0.3*ryesin(f1);
s4x3
=x03+0.2*rxexcos(f1);
s4y3
=y03+0.2*ryesin(f1);

wx3
=x03+met1*rxexcos(f1);
wy3
=y03+met2*ryesin(f1)-
0.1;
s1wx3
=x03+met1*0.9*rxexcos(f1)
;
s1wy3
=y03+met2*0.9*ryesin(f1)
-0.1;
s2wx3
=x03+met1*0.6*rxexcos(f1)
;
s2wy3
=y03+met2*0.6*ryesin(f1)
-0.1;
s3wx3
=x03+met1*0.2*rxexcos(f1)
;
s3wy3
=y03+met2*0.2*ryesin(f1)
-0.1;

x04 = 2.2;
y04 = 1.7;
s4 = basi-x04;
t41 = s4/v;
t42 = (x04-2)/v;
x4 =x04+rxexcos(f1);
y4 =y04+ryesin(f1);
s1x4
=x04+0.9*rxexcos(f1);
s1y4
=y04+0.9*ryesin(f1);
s2x4
=x04+0.6*rxexcos(f1);
s2y4
=y04+0.6*ryesin(f1);
s3x4
=x04+0.3*rxexcos(f1);
s3y4
=y04+0.3*ryesin(f1);
s4x4
=x04+0.2*rxexcos(f1);
s4y4
=y04+0.2*ryesin(f1);

wx4
=x04+met1*rxexcos(f1);
wy4
=y04+met2*ryesin(f1)+0.1
6;
s1wx4
=x04+met1*0.9*rxexcos(f1)
;
s1wy4
=y04+met2*0.9*ryesin(f1)
+0.16;
s2wx4
=x04+met1*0.6*rxexcos(f1)
;
s2wy4
=y04+met2*0.6*ryesin(f1)
+0.16;
s3wx4
=x04+met1*0.2*rxexcos(f1)
;
s3wy4
=y04+met2*0.2*ryesin(f1)
+0.16;

x05 = 2.3;
y05 = 1.25;
s5 = basi-x05;
t51 = s5/v;
t52 = (x05-2)/v;
x5 =x05+rxexcos(f1);
y5 =y05+ryesin(f1);
s1x5
=x05+0.9*rxexcos(f1);
s1y5
=y05+0.9*ryesin(f1);

```

```
s2x5
=x05+0.6*rxexcos(f1);
s2y5
=y05+0.6*ryesin(f1);
s3x5
=x05+0.3*rxexcos(f1);
s3y5
=y05+0.3*ryesin(f1);
s4x5
=x05+0.2*rxexcos(f1);
s4y5
=y05+0.2*ryesin(f1);
wx5
=x05+met1*rxexcos(f1);
wy5
=y05+met2*ryesin(f1)+0.14;
s1wx5
=x05+met1*0.9*rxexcos(f1);
;
s1wy5
=y05+met2*0.9*ryesin(f1)+0.14;
s2wx5
=x05+met1*0.6*rxexcos(f1);
;
s2wy5
=y05+met2*0.6*ryesin(f1)+0.14;
s3wx5
=x05+met1*0.2*rxexcos(f1);
;
s3wy5
=y05+met2*0.2*ryesin(f1)+0.14;

x06 = 2.7;
y06 = 1.2;
s6 = basi-x06;
t61 = s6/v;
t62 = (x06-2)/v;
x6 =x06+rxexcos(f1);
y6 =y06+ryesin(f1);
s1x6
=x06+0.9*rxexcos(f1);
s1y6
=y06+0.9*ryesin(f1);
s2x6
=x06+0.6*rxexcos(f1);
s2y6
=y06+0.6*ryesin(f1);
s3x6
=x06+0.3*rxexcos(f1);
s3y6
=y06+0.3*ryesin(f1);
s4x6
=x06+0.2*rxexcos(f1);
s4y6
=y06+0.2*ryesin(f1);

wx6
=x06+met1*rxexcos(f1);
wy6
=y06+met2*0.9*ryesin(f1)+0.11;
s1wx6
=x06+met1*0.9*rxexcos(f1);
;
s1wy6
=y06+met2*0.9*ryesin(f1)+0.11;
s2wx6
=x06+met1*0.6*rxexcos(f1);
;
s2wy6
=y06+met2*0.6*ryesin(f1)+0.11;
s3wx6
=x06+met1*0.2*rxexcos(f1);
;
s3wy6
=y06+met2*0.2*ryesin(f1)+0.11;
x07 = 2.4;
y07 = 1.4;
s7 = basi-x07;
t71 = s7/v;
t72 = (x07-2)/v;
x7 =x07+rxexcos(f1);
y7 =y07+ryesin(f1);
s1x7
=x07+0.9*rxexcos(f1);
s1y7
=y07+0.9*ryesin(f1);
s2x7
=x07+0.6*rxexcos(f1);
s2y7
=y07+0.6*ryesin(f1);
s3x7
=x07+0.3*rxexcos(f1);
s3y7
=y07+0.3*ryesin(f1);
s4x7
=x07+0.2*rxexcos(f1);
s4y7
=y07+0.2*ryesin(f1);
wx7
=x07+met1*rxexcos(f1);
wy7
=y07+met2*ryesin(f1)+0.15;
s1wx7
=x07+met1*0.9*rxexcos(f1);
;
s1wy7
=y07+met2*0.9*ryesin(f1)+0.15;
s2wx7
=x07+met1*0.6*rxexcos(f1);
;
```

```
s2wy7
=y07+met2*0.6*rye*sin(f1)
+0.15;
s3wx7
=x07+met1*0.2*rx*cos(f1)
;
s3wy7
=y07+met2*0.2*rye*sin(f1)
+0.15;

x08 = 2.8;
y08 = 1.7;
s8 = basi-x08;
t81 = s8/v;
t82 = (x08-2)/v;
x8 =x08+rx*cos(f1);
y8 =y08+rye*sin(f1);
s1x8
=x08+0.9*rx*cos(f1);
s1y8
=y08+0.9*rye*sin(f1);
s2x8
=x08+0.6*rx*cos(f1);
s2y8
=y08+0.6*rye*sin(f1);
s3x8
=x08+0.3*rx*cos(f1);
s3y8
=y08+0.3*rye*sin(f1);
s4x8
=x08+0.2*rx*cos(f1);
s4y8
=y08+0.2*rye*sin(f1);
wx8
=x08+met1*rx*cos(f1);
wy8
=y08+met2*rye*sin(f1)+0.1
2;
s1wx8
=x08+met1*0.9*rx*cos(f1)
;
s1wy8
=y08+met2*0.9*rye*sin(f1)
+0.12;
s2wx8
=x08+met1*0.6*rx*cos(f1)
;
s2wy8
=y08+met2*0.6*rye*sin(f1)
+0.12;
s3wx8
=x08+met1*0.2*rx*cos(f1)
;
s3wy8
=y08+met2*0.2*rye*sin(f1)
+0.12;

x09 = 2.7;
y09 = 1.63;
s9 = basi-x09;

t91 = s9/v;
t92 = (x09-2)/v;
x9 =x09+rx*cos(f1);
y9 =y09+rye*sin(f1);
s1x9
=x09+0.9*rx*cos(f1);
s1y9
=y09+0.9*rye*sin(f1);
s2x9
=x09+0.6*rx*cos(f1);
s2y9
=y09+0.6*rye*sin(f1);
s3x9
=x09+0.3*rx*cos(f1);
s3y9
=y09+0.3*rye*sin(f1);
s4x9
=x09+0.2*rx*cos(f1);
s4y9
=y09+0.2*rye*sin(f1);
wx9
=x09+met1*rx*cos(f1);
wy9
=y09+met2*rye*sin(f1)-
0.1;
s1wx9
=x09+met1*0.9*rx*cos(f1)
;
s1wy9
=y09+met2*0.9*rye*sin(f1)
-0.1;
s2wx9
=x09+met1*0.6*rx*cos(f1)
;
s2wy9
=y09+met2*0.6*rye*sin(f1)
-0.1;
s3wx9
=x09+met1*0.2*rx*cos(f1)
;
s3wy9
=y09+met2*0.2*rye*sin(f1)
-0.1;

x010 = 2.1;
y010 = 1.46;
s10 = basi-x010;
t101 = s10/v;
t102 = (x010-2)/v;
x10 =x010+rx*cos(f1);
y10 =y010+rye*sin(f1);
s1x10
=x010+0.9*rx*cos(f1);
s1y10
=y010+0.9*rye*sin(f1);
s2x10
=x010+0.6*rx*cos(f1);
s2y10
=y010+0.6*rye*sin(f1);
```

```

s3x10
=x010+0.3*rxexcos(f1);
s3y10
=y010+0.3*ryesin(f1);
s4x10
=x010+0.2*rxexcos(f1);
s4y10
=y010+0.2*ryesin(f1);
wx10
=x010+met1*rxexcos(f1);
wy10
=y010+met2*ryesin(f1)-
0.12;
s1wx10
=x010+met1*0.9*rxexcos(f1
);
s1wy10
=y010+met2*0.9*ryesin(f1
)-0.12;
s2wx10
=x010+met1*0.6*rxexcos(f1
);
s2wy10
=y010+met2*0.6*ryesin(f1
)-0.12;
s3wx10
=x010+met1*0.2*rxexcos(f1
);
s3wy10
=y010+met2*0.2*ryesin(f1
)-0.12;

x011 = 2.2;
y011 = 1.34;
s11 = basi-x011;
t111 = s11/v;
t112 = (x011-2)/v;
x11 =x011+rxexcos(f1);
y11 =y011+ryesin(f1);
s1x11
=x011+0.9*rxexcos(f1);
s1y11
=y011+0.9*ryesin(f1);
s2x11
=x011+0.6*rxexcos(f1);
s2y11
=y011+0.6*ryesin(f1);
s3x11
=x011+0.3*rxexcos(f1);
s3y11
=y011+0.3*ryesin(f1);
s4x11
=x011+0.2*rxexcos(f1);
s4y11
=y011+0.2*ryesin(f1);
wx11
=x011+met1*rxexcos(f1);

wy11
=y011+met2*ryesin(f1)-
0.16;
s1wx11
=x011+met1*0.9*rxexcos(f1
);
s1wy11
=y011+met2*0.9*ryesin(f1
)-0.16;
s2wx11
=x011+met1*0.6*rxexcos(f1
);
s2wy11
=y011+met2*0.6*ryesin(f1
)-0.16;
s3wx11
=x011+met1*0.2*rxexcos(f1
);
s3wy11
=y011+met2*0.2*ryesin(f1
)-0.16;

x012 = 2.4;
y012 = 1.8;
s12 = basi-x012;
t121 = s12/v;
t122 = (x012-2)/v;
x12 =x012+rxexcos(f1);
y12 =y012+ryesin(f1);
s1x12
=x012+0.9*rxexcos(f1);
s1y12
=y012+0.9*ryesin(f1);
s2x12
=x012+0.6*rxexcos(f1);
s2y12
=y012+0.6*ryesin(f1);
s3x12
=x012+0.3*rxexcos(f1);
s3y12
=y012+0.3*ryesin(f1);
s4x12
=x012+0.2*rxexcos(f1);
s4y12
=y012+0.2*ryesin(f1);
wx12
=x012+met1*rxexcos(f1);
wy12
=y012+met2*ryesin(f1)-
0.19;
s1wx12
=x012+met1*0.9*rxexcos(f1
);
s1wy12
=y012+met2*0.9*ryesin(f1
)-0.19;
s2wx12
=x012+met1*0.6*rxexcos(f1
);

```

```

s2wy12
=y012+met2*0.6*rye*sin(f1
)-0.19;
s3wx12
=x012+met1*0.2*rx*cos(f1
);
s3wy12
=y012+met2*0.2*rye*sin(f1
)-0.19;

x013 = 2.45;
y013 = 1.6;
s13 = basi-x013;
t131 = s13/v;
t132 = (x013-2)/v;
x13 =x013+rx*cos(f1);
y13 =y013+ry*sin(f1);
s1x13
=x013+0.9*rx*cos(f1);
s1y13
=y013+0.9*ry*sin(f1);
s2x13
=x013+0.6*rx*cos(f1);
s2y13
=y013+0.6*ry*sin(f1);
s3x13
=x013+0.3*rx*cos(f1);
s3y13
=y013+0.3*ry*sin(f1);
s4x13
=x013+0.2*rx*cos(f1);
s4y13
=y013+0.2*ry*sin(f1);
wx13
=x013+met1*rx*cos(f1);
wy13
=y013+met2*ry*sin(f1)+0.
1;
s1wx13
=x013+met1*0.9*rx*cos(f1
);
s1wy13
=y013+met2*0.9*ry*sin(f1
)+0.1;
s2wx13
=x013+met1*0.6*rx*cos(f1
);
s2wy13
=y013+met2*0.6*ry*sin(f1
)+0.1;
s3wx13
=x013+met1*0.2*rx*cos(f1
);
s3wy13
=y013+met2*0.2*ry*sin(f1
)+0.1;

x014 = 2.65;
y014 = 1.48;
s14 = basi-x014;

t141 = s14/v;
t142 = (x014-2)/v;
x14 =x014+rx*cos(f1);
y14 =y014+ry*sin(f1);
s1x14
=x014+0.9*rx*cos(f1);
s1y14
=y014+0.9*ry*sin(f1);
s2x14
=x014+0.6*rx*cos(f1);
s2y14
=y014+0.6*ry*sin(f1);
s3x14
=x014+0.3*rx*cos(f1);
s3y14
=y014+0.3*ry*sin(f1);
s4x14
=x014+0.2*rx*cos(f1);
s4y14
=y014+0.2*ry*sin(f1);
wx14
=x014+met1*rx*cos(f1);
wy14
=y014+met2*ry*sin(f1)+0.
16;
s1wx14
=x014+met1*0.9*rx*cos(f1
);
s1wy14
=y014+met2*0.9*ry*sin(f1
)+0.16;
s2wx14
=x014+met1*0.6*rx*cos(f1
);
s2wy14
=y014+met2*0.6*ry*sin(f1
)+0.16;
s3wx14
=x014+met1*0.2*rx*cos(f1
);
s3wy14
=y014+met2*0.2*ry*sin(f1
)+0.16;

x015 = 2.9;
y015 = 1.3;
s15 = basi-x015;
t151 = s15/v;
t152 = (x015-2)/v;
x15 =x015+rx*cos(f1);
y15 =y015+ry*sin(f1);
s1x15
=x015+0.9*rx*cos(f1);
s1y15
=y015+0.9*ry*sin(f1);
s2x15
=x015+0.6*rx*cos(f1);
s2y15
=y015+0.6*ry*sin(f1);

```

```

s3x15
=x015+0.3*rxexcos(f1);
s3y15
=y015+0.3*ryesin(f1);
s4x15
=x015+0.2*rxexcos(f1);
s4y15
=y015+0.2*ryesin(f1);
wx15
=x015+met1*rxexcos(f1);
wy15
=y015+met2*ryesin(f1)+0.11;
s1wx15
=x015+met1*0.9*rxexcos(f1);
s1wy15
=y015+met2*0.9*ryesin(f1)+0.11;
s2wx15
=x015+met1*0.6*rxexcos(f1);
s2wy15
=y015+met2*0.6*ryesin(f1)+0.11;
s3wx15
=x015+met1*0.2*rxexcos(f1);
s3wy15
=y015+met2*0.2*ryesin(f1)+0.11;

x016= 2.8;
y016 = 1.45;
s16 = basi-x016;
t161 = s16/v;
t162 =(x016-2)/v;
x16 =x016+rxexcos(f1);
y16 =y016+ryesin(f1);
s1x16
=x016+0.9*rxexcos(f1);
s1y16
=y016+0.9*ryesin(f1);
s2x16
=x016+0.6*rxexcos(f1);
s2y16
=y016+0.6*ryesin(f1);
s3x16
=x016+0.3*rxexcos(f1);
s3y16
=y016+0.3*ryesin(f1);
s4x16
=x016+0.2*rxexcos(f1);
s4y16
=y016+0.2*ryesin(f1);
wx16
=x016+met1*rxexcos(f1);
wy16
=y016+met2*ryesin(f1)-0.1;
s1wx16
=x016+met1*0.9*rxexcos(f1);
s1wy16
=y016+met2*0.9*ryesin(f1)-0.1;
s2wx16
=x016+met1*0.6*rxexcos(f1);
s2wy16
=y016+met2*0.6*ryesin(f1)-0.1;
s3wx16
=x016+met1*0.2*rxexcos(f1);
s3wy16
=y016+met2*0.2*ryesin(f1)-0.1;

x017= 2.95;
y017 = 1.65;
s17 = basi-x017;
t171 = s17/v;
t172 =(x017-2)/v;
x17 =x017+rxexcos(f1);
y17 =y017+ryesin(f1);
s1x17
=x017+0.9*rxexcos(f1);
s1y17
=y017+0.9*ryesin(f1);
s2x17
=x017+0.6*rxexcos(f1);
s2y17
=y017+0.6*ryesin(f1);
s3x17
=x017+0.3*rxexcos(f1);
s3y17
=y017+0.3*ryesin(f1);
s4x17
=x017+0.2*rxexcos(f1);
s4y17
=y017+0.2*ryesin(f1);
wx17
=x017+met1*rxexcos(f1);
wy17
=y017+met2*ryesin(f1)-0.14;
s1wx17
=x017+met1*0.9*rxexcos(f1);
s1wy17
=y017+met2*0.9*ryesin(f1)-0.14;
s2wx17
=x017+met1*0.6*rxexcos(f1);
s2wy17
=y017+met2*0.6*ryesin(f1)-0.14;

```

```

s2wy17
=y017+met2*0.6*rye*sin(f1
)-0.14;
s3wx17
=x017+met1*0.2*rxex*cos(f1
);
s3wy17
=y017+met2*0.2*rye*sin(f1
)-0.14;

x018= 2.07;
y018 = 1.9;
s18 = basi-x018;
t181 = s18/v;
t182 =(x018-2)/v;
x18 =x018+rxex*cos(f1);
y18 =y018+rye*sin(f1);
s1x18
=x018+0.9*rxex*cos(f1);
s1y18
=y018+0.9*rye*sin(f1);
s2x18
=x018+0.6*rxex*cos(f1);
s2y18
=y018+0.6*rye*sin(f1);
s3x18
=x018+0.3*rxex*cos(f1);
s3y18
=y018+0.3*rye*sin(f1);
s4x18
=x018+0.2*rxex*cos(f1);
s4y18
=y018+0.2*rye*sin(f1);
wx18=x018+met1*rxex*cos(f1
);
wy18
=y018+met2*rye*sin(f1)-
0.12;
s1wx18
=x018+met1*0.9*rxex*cos(f1
);
s1wy18
=y018+met2*0.9*rye*sin(f1
)-0.12;
s2wx18
=x018+met1*0.6*rxex*cos(f1
);
s2wy18
=y018+met2*0.6*rye*sin(f1
)-0.12;
s3wx18
=x018+met1*0.2*rxex*cos(f1
);
s3wy18
=y018+met2*0.2*rye*sin(f1
)-0.12;

x019= 2.9;
y019 = 1.82;
s19 = basi-x019;
t191 = s19/v;
t192 =(x019-2)/v;
x19 =x019+rxex*cos(f1);
y19 =y019+rye*sin(f1);
s1x19
=x019+0.9*rxex*cos(f1);
s1y19
=y019+0.9*rye*sin(f1);
s2x19
=x019+0.6*rxex*cos(f1);
s2y19
=y019+0.6*rye*sin(f1);
s3x19
=x019+0.3*rxex*cos(f1);
s3y19
=y019+0.3*rye*sin(f1);
s4x19
=x019+0.2*rxex*cos(f1);
s4y19
=y019+0.2*rye*sin(f1);
wx19
=x019+met1*rxex*cos(f1);
wy19
=y019+met2*rye*sin(f1)-
0.17;
s1wx19
=x019+met1*0.9*rxex*cos(f1
);
s1wy19
=y019+met2*0.9*rye*sin(f1
)-0.17;
s2wx19
=x019+met1*0.6*rxex*cos(f1
);
s2wy19
=y019+met2*0.6*rye*sin(f1
)-0.17;
s3wx19
=x019+met1*0.2*rxex*cos(f1
);
s3wy19
=y019+met2*0.2*rye*sin(f1
)-0.17;

x020= 2.6;
y020 = 1.3;
s20 = basi-x020;
t201 = s20/v;
t202 =(x020-2)/v;
x20 =x020+rxex*cos(f1);
y20 =y020+rye*sin(f1);
s1x20
=x020+0.9*rxex*cos(f1);
s1y20
=y020+0.9*rye*sin(f1);

```



```

s2x20
=x020+0.6*rxexcos(f1);
s2y20
=y020+0.6*ryesin(f1);
s3x20
=x020+0.3*rxexcos(f1);
s3y20
=y020+0.3*ryesin(f1);
s4x20
=x020+0.2*rxexcos(f1);
s4y20
=y020+0.2*ryesin(f1);
wx20
=x020+met1*rxexcos(f1);
wy20
=y020+met2*ryesin(f1)-
0.08;
slwx20
=x020+met1*0.9*rxexcos(f1
);
slwy20
=y020+met2*0.9*ryesin(f1
)-0.08;
s2wx20
=x020+met1*0.6*rxexcos(f1
);
s2wy20
=y020+met2*0.6*ryesin(f1
)-0.08;
s3wx20
=x020+met1*0.2*rxexcos(f1
);
s3wy20
=y020+met2*0.2*ryesin(f1
)-0.08;

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p1 = 0.9;
p2 = 0.6;
p3 = 0.2;
basia = 2.5;

ay01 = 1;
ax01 =2.03;
as1 = basia-ay01;
at11 = as1/v;
at12 = (ay01-1)/v;
aT =t11+t12;
ax1
=ax01+0.4*rxexcos(f1);
ay1
=ay01+0.4*ryesin(f1);
slax1
=ax01+0.4*p1*rxexcos(f1);
slay1
=ay01+0.4*p1*ryesin(f1);

s2ax1
=ax01+0.4*p2*rxexcos(f1);
s2ay1
=ay01+0.4*p2*ryesin(f1);
s3ax1
=ax01+0.4*p3*rxexcos(f1);
s3ay1
=ay01+0.4*p3*ryesin(f1);

ay02 = 1.14;
ax02 =2.02;
as2 = basia-ay02;
at21 = as2/v;
at22 = (ay02-1)/v;
ax2
=ax02+0.7*rxexcos(f1);
ay2
=ay02+0.7*ryesin(f1);
slax2
=ax02+0.4*p1*rxexcos(f1);
slay2
=ay02+0.4*p1*ryesin(f1);
s2ax2
=ax02+0.4*p2*rxexcos(f1);
s2ay2
=ay02+0.4*p2*ryesin(f1);
s3ax2
=ax02+0.4*p3*rxexcos(f1);
s3ay2
=ay02+0.4*p3*ryesin(f1);

ay03 = 1.34;
ax03 =2;
as3 = basia-ay03;
at31 = as3/v;
at32 = (ay03-1)/v;
ax3
=ax03+0.6*rxexcos(f1);
ay3
=ay03+0.6*ryesin(f1);
slax3
=ax03+0.4*p1*rxexcos(f1);
slay3
=ay03+0.4*p1*ryesin(f1);
s2ax3
=ax03+0.4*p2*rxexcos(f1);
s2ay3
=ay03+0.4*p2*ryesin(f1);
s3ax3
=ax03+0.4*p3*rxexcos(f1);
s3ay3
=ay03+0.4*p3*ryesin(f1);

ay04 = 1.53;
ax04 =2.022;
as4 = basia-ay04;
at41 = as4/v;
at42 = (ay04-1)/v;
ax4
=ax04+0.5*rxexcos(f1);

```

```
ay4
=ay04+0.5*rye*sin(f1);
slax4
=ax04+0.4*p1*rxe*cos(f1);
slay4
=ay04+0.4*p1*rye*sin(f1);
s2ax4
=ax04+0.4*p2*rxe*cos(f1);
s2ay4
=ay04+0.4*p2*rye*sin(f1);
s3ax4
=ax04+0.4*p3*rxe*cos(f1);
s3ay4
=ay04+0.4*p3*rye*sin(f1);

ay05 = 1.70;
ax05 =2.03;
as5 = basia-ay05;
at51 = as5/v;
at52 = (ay05-1)/v;
ax5
=ax05+0.54*rxe*cos(f1);
ay5
=ay05+0.54*rye*sin(f1);
slax5
=ax05+0.4*p1*rxe*cos(f1);
slay5
=ay05+0.4*p1*rye*sin(f1);
s2ax5
=ax05+0.4*p2*rxe*cos(f1);
s2ay5
=ay05+0.4*p2*rye*sin(f1);
s3ax5
=ax05+0.4*p3*rxe*cos(f1);
s3ay5
=ay05+0.4*p3*rye*sin(f1);

ay06 = 1.83;
ax06 =1.994;
as6 = basia-ay06;
at61 = as6/v;
at62 = (ay06-1)/v;
ax6
=ax06+0.59*rxe*cos(f1);
ay6
=ay06+0.59*rye*sin(f1);
slax6
=ax06+0.4*p1*rxe*cos(f1);
slay6
=ay06+0.4*p1*rye*sin(f1);
s2ax6
=ax06+0.4*p2*rxe*cos(f1);
s2ay6
=ay06+0.4*p2*rye*sin(f1);
s3ax6
=ax06+0.4*p3*rxe*cos(f1);
s3ay6
=ay06+0.4*p3*rye*sin(f1);

ay07 = 2;
ax07 =2.01;
as7 = basia-ay07;
at71 = as7/v;
at72 = (ay07-1)/v;
ax7
=ax07+0.65*rxe*cos(f1);
ay7
=ay07+0.65*rye*sin(f1);
slax7
=ax07+0.4*p1*rxe*cos(f1);
slay7
=ay07+0.4*p1*rye*sin(f1);
s2ax7
=ax07+0.4*p2*rxe*cos(f1);
s2ay7
=ay07+0.4*p2*rye*sin(f1);
s3ax7
=ax07+0.4*p3*rxe*cos(f1);
s3ay7
=ay07+0.4*p3*rye*sin(f1);

ay08 = 2.2;
ax08 =2.03;
as8 = basia-ay08;
at81 = as8/v;
at82 = (ay08-1)/v;
ax8
=ax08+0.29*rxe*cos(f1);
ay8
=ay08+0.29*rye*sin(f1);
slax8
=ax08+0.4*p1*rxe*cos(f1);
slay8
=ay08+0.4*p1*rye*sin(f1);
s2ax8
=ax08+0.4*p2*rxe*cos(f1);
s2ay8
=ay08+0.4*p2*rye*sin(f1);
s3ax8
=ax08+0.4*p3*rxe*cos(f1);
s3ay8
=ay01+0.4*p3*rye*sin(f1);

ay09 = 2.3;
ax09 =2.02;
as9 = basia-ay09;
at91 = as9/v;
at92 = (ay09-1)/v;
ax9
=ax09+0.33*rxe*cos(f1);
ay9
=ay09+0.33*rye*sin(f1);
slax9
=ax09+0.4*p1*rxe*cos(f1);
slay9
=ay09+0.4*p1*rye*sin(f1);
s2ax9
=ax09+0.4*p2*rxe*cos(f1);
s2ay9
=ay09+0.4*p2*rye*sin(f1);
```

```

s3ax9
=ax09+0.4*p3*rxe*cos(f1);
s3ay9
=ay09+0.4*p3*rye*sin(f1);

ay010 = 2.45;
ax010 =2.01;
as10 = basia-ay010;
at101 = as10/v;
at102 =(ay010-1)/v;
ax10
=ax010+0.4*rxe*cos(f1);
ay10
=ay010+0.4*rye*sin(f1);
s1ax10
=ax010+0.4*p1*rxe*cos(f1)
;
s1ay10
=ay010+0.4*p1*rye*sin(f1)
;
s2ax10
=ax010+0.4*p2*rxe*cos(f1)
;
s2ay10
=ay010+0.4*p2*rye*sin(f1)
;
s3ax10
=ax010+0.4*p3*rxe*cos(f1)
;
s3ay10
=ay010+0.4*p3*rye*sin(f1)
;

fysx =
2.35+0.8*rxe*cos(f13);
fysy =
2.21+0.8*rye*sin(f13);
s1fysx =
2.35+0.8*p1*rxe*cos(f13);
s1fysy =
2.21+0.8*p1*rye*sin(f13);
s2fysx =
2.35+0.8*p2*rxe*cos(f13);
s2fysy =
2.21+0.8*p2*rye*sin(f13);
s3fysx =
2.35+0.8*p3*rxe*cos(f13);
s3fysy =
2.21+0.8*p3*rye*sin(f13);

fill(ypovx, ypovy, [0.9
0.9 0.9] ,...
basx1, basy1, [0.76 0.36
0] ,...
basbx1, basby1, [0.6 0.2
0] ,...
bascx1, bascy1, [0.8 0.4
0] ,...
basx2, basy2, [0.76 0.36
0] ,...
basbx2, basby2, [0.6 0.2
0] ,...
bascx2, bascy2, [0.8 0.4
0] ,...
x1, y1, [0.2 0.7
0.2],...
s1x1, s1y1, [0.3 0.75
0.3],...
s2x1, s2y1, [0.4 0.8
0.4],...
s3x1, s3y1, [0.5 0.85
0.5],...
s4x1, s4y1, [0.6 0.9
0.6],...
x2, y2, [0.2 0.7
0.2],...
s1x2, s1y2, [0.3 0.75
0.3],...
s2x2, s2y2, [0.4 0.8
0.4],...
s3x2, s3y2, [0.5 0.85
0.5],...
s4x2, s4y2, [0.6 0.9
0.6],...
x3, y3, [0.2 0.7
0.2],...
s1x3, s1y3, [0.3 0.75
0.3],...
s2x3, s2y3, [0.4 0.8
0.4],...
s3x3, s3y3, [0.5 0.85
0.5],...
s4x3, s4y3, [0.6 0.9
0.6],...
x4, y4, [0.2 0.7
0.2],...
s1x4, s1y4, [0.3 0.75
0.3],...
s2x4, s2y4, [0.4 0.8
0.4],...
s3x4, s3y4, [0.5 0.85
0.5],...
s4x4, s4y4, [0.6 0.9
0.6],...
x5, y5, [0.2 0.7
0.2],...
s1x5, s1y5, [0.3 0.75
0.3],...
s2x5, s2y5, [0.4 0.8
0.4],...
s3x5, s3y5, [0.5 0.85
0.5],...
s4x5, s4y5, [0.6 0.9
0.6],...
x6, y6, [0.2 0.7
0.2],...
s1x6, s1y6, [0.3 0.75
0.3],...

```

s2x6, s2y6, [0.4 0.8 0.4],...	s2x12, s2y12, [0.4 0.8 0.4],...
s3x6, s3y6, [0.5 0.85 0.5],...	s3x12, s3y12, [0.5 0.85 0.5],...
s4x6, s4y6, [0.6 0.9 0.6],...	s4x12, s4y12, [0.6 0.9 0.6],...
x7, y7, [0.2 0.7 0.2],...	x13, y13, [0.2 0.7 0.2],...
s1x7, s1y7, [0.3 0.75 0.3],...	s1x13, s1y13, [0.3 0.75 0.3],...
s2x7, s2y7, [0.4 0.8 0.4],...	s2x13, s2y13, [0.4 0.8 0.4],...
s3x7, s3y7, [0.5 0.85 0.5],...	s3x13, s3y13, [0.5 0.85 0.5],...
s4x7, s4y7, [0.6 0.9 0.6],...	s4x13, s4y13, [0.6 0.9 0.6],...
x8, y8, [0.2 0.7 0.2],...	x14, y14, [0.2 0.7 0.2],...
s1x8, s1y8, [0.3 0.75 0.3],...	s1x14, s1y14, [0.3 0.75 0.3],...
s2x8, s2y8, [0.4 0.8 0.4],...	s2x14, s2y14, [0.4 0.8 0.4],...
s3x8, s3y8, [0.5 0.85 0.5],...	s3x14, s3y14, [0.5 0.85 0.5],...
s4x8, s4y8, [0.6 0.9 0.6],...	s4x14, s4y14, [0.6 0.9 0.6],...
x9, y9, [0.2 0.7 0.2],...	x15, y15, [0.2 0.7 0.2],...
s1x9, s1y9, [0.3 0.75 0.3],...	s1x15, s1y15, [0.3 0.75 0.3],...
s2x9, s2y9, [0.4 0.8 0.4],...	s2x15, s2y15, [0.4 0.8 0.4],...
s3x9, s3y9, [0.5 0.85 0.5],...	s3x15, s3y15, [0.5 0.85 0.5],...
s4x9, s4y9, [0.6 0.9 0.6],...	s4x15, s4y15, [0.6 0.9 0.6],...
x10, y10, [0.2 0.7 0.2],...	x16, y16, [0.2 0.7 0.2],...
s1x10, s1y10, [0.3 0.75 0.3],...	s1x16, s1y16, [0.3 0.75 0.3],...
s2x10, s2y10, [0.4 0.8 0.4],...	s2x16, s2y16, [0.4 0.8 0.4],...
s3x10, s3y10, [0.5 0.85 0.5],...	s3x16, s3y16, [0.5 0.85 0.5],...
s4x10, s4y10, [0.6 0.9 0.6],...	s4x16, s4y16, [0.6 0.9 0.6],...
x11, y11, [0.2 0.7 0.2],...	x17, y17, [0.2 0.7 0.2],...
s1x11, s1y11, [0.3 0.75 0.3],...	s1x17, s1y17, [0.3 0.75 0.3],...
s2x11, s2y11, [0.4 0.8 0.4],...	s2x17, s2y17, [0.4 0.8 0.4],...
s3x11, s3y11, [0.5 0.85 0.5],...	s3x17, s3y17, [0.5 0.85 0.5],...
s4x11, s4y11, [0.6 0.9 0.6],...	s4x17, s4y17, [0.6 0.9 0.6],...
x12, y12, [0.2 0.7 0.2],...	x18, y18, [0.2 0.7 0.2],...
s1x12, s1y12, [0.3 0.75 0.3],...	s1x18, s1y18, [0.3 0.75 0.3],...

s2x18, s2y18, [0.4 0.8
0.4],...
s3x18, s3y18, [0.5 0.85
0.5],...
s4x18, s4y18, [0.6 0.9
0.6],...
x19, y19, [0.2 0.7
0.2],...
s1x19, s1y19, [0.3 0.75
0.3],...
s2x19, s2y19, [0.4 0.8
0.4],...
s3x19, s3y19, [0.5 0.85
0.5],...
s4x19, s4y19, [0.6 0.9
0.6],...
x20, y20, [0.2 0.7
0.2],...
s1x20, s1y20, [0.3 0.75
0.3],...
s2x20, s2y20, [0.4 0.8
0.4],...
s3x20, s3y20, [0.5 0.85
0.5],...
s4x20, s4y20, [0.6 0.9
0.6],...
xc1, yc1, [0.2 0.7
0.2],...
s1xc1, s1yc1, [0.3 0.75
0.3],...
s2xc1, s2yc1, [0.4 0.8
0.4],...
s3xc1, s3yc1, [0.5 0.85
0.5],...
s4xc1, s4yc1, [0.6 0.9
0.6],...
wx1, wy1, [0.8 0 0],...
s1wx1, s1wy1, [0.9 0.2
0.2],...
s2wx1, s2wy1, [1 0.4
0.4],...
s3wx1, s3wy1, [1 0.7
0.7],...
wx2, wy2, [0.8 0 0],...
s1wx2, s1wy2, [0.9 0.2
0.2],...
s2wx2, s2wy2, [1 0.4
0.4],...
s3wx2, s3wy2, [1 0.7
0.7],...
wx3, wy3, [0.8 0 0],...
s1wx3, s1wy3, [0.9 0.2
0.2],...
s2wx3, s2wy3, [1 0.4
0.4],...
s3wx3, s3wy3, [1 0.7
0.7],...
wx4, wy4, [0.8 0 0],...
s1wx4, s1wy4, [0.9 0.2
0.2],...
s2wx4, s2wy4, [1 0.4
0.4],...
s3wx4, s3wy4, [1 0.7
0.7],...
wx5, wy5, [0.8 0 0],...
s1wx5, s1wy5, [0.9 0.2
0.2],...
s2wx5, s2wy5, [1 0.4
0.4],...
s3wx5, s3wy5, [1 0.7
0.7],...
wx6, wy6, [0.8 0 0],...
s1wx6, s1wy6, [0.9 0.2
0.2],...
s2wx6, s2wy6, [1 0.4
0.4],...
s3wx6, s3wy6, [1 0.7
0.7],...
wx7, wy7, [0.8 0 0],...
s1wx7, s1wy7, [0.9 0.2
0.2],...
s2wx7, s2wy7, [1 0.4
0.4],...
s3wx7, s3wy7, [1 0.7
0.7],...
wx8, wy8, [0.8 0 0],...
s1wx8, s1wy8, [0.9 0.2
0.2],...
s2wx8, s2wy8, [1 0.4
0.4],...
s3wx8, s3wy8, [1 0.7
0.7],...
wx9, wy9, [0.8 0 0],...
s1wx9, s1wy9, [0.9 0.2
0.2],...
s2wx9, s2wy9, [1 0.4
0.4],...
s3wx9, s3wy9, [1 0.7
0.7],...
wx10, wy10, [0.8 0 0],...
s1wx10, s1wy10, [0.9 0.2
0.2],...
s2wx10, s2wy10, [1 0.4
0.4],...
s3wx10, s3wy10, [1 0.7
0.7],...
wx11, wy11, [0.8 0 0],...
s1wx11, s1wy11, [0.9 0.2
0.2],...
s2wx11, s2wy11, [1 0.4
0.4],...
s3wx11, s3wy11, [1 0.7
0.7],...
wx12, wy12, [0.8 0 0],...
s1wx12, s1wy12, [0.9 0.2
0.2],...
s2wx12, s2wy12, [1 0.4
0.4],...
s3wx12, s3wy12, [1 0.7
0.7],...

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wx13, wy13, [0.8 0 0],...
s1wx13, s1wy13, [0.9 0.2
0.2],...
s2wx13, s2wy13, [1 0.4
0.4],...
s3wx13, s3wy13, [1 0.7
0.7],...
wx14, wy14, [0.8 0 0],...
s1wx14, s1wy14, [0.9 0.2
0.2],...
s2wx14, s2wy14, [1 0.4
0.4],...
s3wx14, s3wy14, [1 0.7
0.7],...
wx15, wy15, [0.8 0 0],...
s1wx15, s1wy15, [0.9 0.2
0.2],...
s2wx15, s2wy15, [1 0.4
0.4],...
s3wx15, s3wy15, [1 0.7
0.7],...
wx16, wy16, [0.8 0 0],...
s1wx16, s1wy16, [0.9 0.2
0.2],...
s2wx16, s2wy16, [1 0.4
0.4],...
s3wx16, s3wy16, [1 0.7
0.7],...
wx17, wy17, [0.8 0 0],...
s1wx17, s1wy17, [0.9 0.2
0.2],...
s2wx17, s2wy17, [1 0.4
0.4],...
s3wx17, s3wy17, [1 0.7
0.7],...
wx18, wy18, [0.8 0 0],...
s1wx18, s1wy18, [0.9 0.2
0.2],...
s2wx18, s2wy18, [1 0.4
0.4],...
s3wx18, s3wy18, [1 0.7
0.7],...
wx19, wy19, [0.8 0 0],...
s1wx19, s1wy19, [0.9 0.2
0.2],...
s2wx19, s2wy19, [1 0.4
0.4],...
s3wx19, s3wy19, [1 0.7
0.7],...
wx20, wy20, [0.8 0 0],...
s1wx20, s1wy20, [0.9 0.2
0.2],...
s2wx20, s2wy20, [1 0.4
0.4],...
s3wx20, s3wy20, [1 0.7
0.7],...
xna, yna, [0.8 0 0],...
s1xna, s1yna, [0.9 0.2
0.2],...
s2xna, s2yna, [1 0.4
0.4],...
s3xna, s3yna, [1 0.7
0.7],...
ax1, ay1, [0.5 0.8
0.5],...
s1ax1, s1ay1, [0.6 0.9
0.6],...
s2ax1, s2ay1, [0.7 0.95
0.7],...
s3ax1, s3ay1, [0.8 1
0.8],...
ax2, ay2, [0.5 0.8
0.5],...
s1ax2, s1ay2, [0.6 0.9
0.6],...
s2ax2, s2ay2, [0.7 0.95
0.7],...
s3ax2, s3ay2, [0.8 1
0.8],...
ax3, ay3, [0.5 0.8
0.5],...
s1ax3, s1ay3, [0.6 0.9
0.6],...
s2ax3, s2ay3, [0.7 0.95
0.7],...
s3ax3, s3ay3, [0.8 1
0.8],...
ax4, ay4, [0.5 0.8
0.5],...
s1ax4, s1ay4, [0.6 0.9
0.6],...
s2ax4, s2ay4, [0.7 0.95
0.7],...
s3ax4, s3ay4, [0.8 1
0.8],...
ax5, ay5, [0.5 0.8
0.5],...
s1ax5, s1ay5, [0.6 0.9
0.6],...
s2ax5, s2ay5, [0.7 0.95
0.7],...
s3ax5, s3ay5, [0.8 1
0.8],...
ax6, ay6, [0.5 0.8
0.5],...
s1ax6, s1ay6, [0.6 0.9
0.6],...
s2ax6, s2ay6, [0.7 0.95
0.7],...
s3ax6, s3ay6, [0.8 1
0.8],...
ax7, ay7, [0.5 0.8
0.5],...
s1ax7, s1ay7, [0.6 0.9
0.6],...
s2ax7, s2ay7, [0.7 0.95
0.7],...
s3ax7, s3ay7, [0.8 1
0.8],...

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ax8, ay8, [0.5 0.8
0.5],...
s1ax8, s1ay8, [0.6 0.9
0.6],...
s2ax8, s2ay8, [0.7 0.95
0.7],...
s3ax8, s3ay8, [0.8 1
0.8],...
ax9, ay9, [0.5 0.8
0.5],...
s1ax9, s1ay9, [0.6 0.9
0.6],...
s2ax9, s2ay9, [0.7 0.95
0.7],...
s3ax9, s3ay9, [0.8 1
0.8],...

ax10, ay10, [0.5 0.8
0.5],...
s1ax10, s1ay10, [0.6 0.9
0.6],...
s2ax10, s2ay10, [0.7 0.95
0.7],...
s3ax10, s3ay10, [0.8 1
0.5],...
fysx, fysy , [0.5 0.8
0.5],...
s1fysx, s1fysy , [0.6 0.9
0.6],...
s2fysx, s2fysy , [0.7
0.95 0.7],...
s3fysx, s3fysy , [0.8 1
0.8],...
'LineStyle','none')

axis([1.7 3.2 0.75 2.5]);
text(1.9 , 2.35, '+','FontSize',20)
text(1.85 , 2.27, 'ΑΝΟΔΟΣ','FontSize',12)
text(2.95 , 2.35, '-','FontSize',22)
text(2.85 , 2.27, 'ΚΑΘΟΔΟΣ','FontSize',12)

text(2.4 , 2.3, 'Na','FontSize',12)
text(2.4 , 2.405, 'Cl','FontSize',12)

text(2.45 , 2.315, '+','FontSize',10)
text(2.45 , 2.43, '-','FontSize',16)

text(2.4 , 2.21, 'Φυσαλίδες χλωρίου','FontSize',10)

axis off
pause(2)

daer =1.5;
vaer =1;
T3 =daer/vaer;

%
i =1;

t3 = 0;
% pause(5)
tol = 5*T;
for t =tol:-0.01:0
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

if (stam==1)

```

```

cc=stam;
while (cc==1)
cc=stam;
pause(ryte);
if (status==1)
return
end
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
t3=t3+0.01;
%
tt = tol-t;

m3 =fix(t3/T3);

m = fix(t/T);
m1=fix(tt/T);

% KINHSH AERIU Anerxomeno
aerio

% lo tmhma kinisis
if
(m3*T3<=t3) & (t3<m3*T3+at1
1)
ayy1 =ay1+v*(t3-m3*T3);
slayy1 =slay1+v*(t3-
m3*T3);
s2ayy1 =s2ay1+v*(t3-
m3*T3);
s3ayy1 =s3ay1+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at2
1)
ayy2 =ay2+v*(t3-m3*T3);
slayy2 =slay2+v*(t3-
m3*T3);
s2ayy2 =s2ay2+v*(t3-
m3*T3);
s3ayy2 =s3ay2+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at3
1)
ayy3 =ay3+v*(t3-m3*T3);
slayy3 =slay3+v*(t3-
m3*T3);
s2ayy3 =s2ay3+v*(t3-
m3*T3);

s3ayy3 =s3ay3+v*(t3-
m3*T3);

s3ayy3 =s3ay3+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at4
1)
ayy4 =ay4+v*(t3-m3*T3);
slayy4 =slay4+v*(t3-
m3*T3);
s2ayy4 =s2ay4+v*(t3-
m3*T3);
s3ayy4 =s3ay4+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at5
1)
ayy5 =ay5+v*(t3-m3*T3);
slayy5 =slay5+v*(t3-
m3*T3);
s2ayy5 =s2ay5+v*(t3-
m3*T3);
s3ayy5 =s3ay5+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at6
1)
ayy6 =ay6+v*(t3-m3*T3);
slayy6 =slay6+v*(t3-
m3*T3);
s2ayy6 =s2ay6+v*(t3-
m3*T3);

```



```

s3ayy6 =s3ay6+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at7
1)
ayy7 =ay7+v*(t3-m3*T3);
slayy7 =slay7+v*(t3-
m3*T3);
s2ayy7 =s2ay7+v*(t3-
m3*T3);
s3ayy7 =s3ay7+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at8
1)
ayy8 =ay8+v*(t3-m3*T3);
slayy8 =slay8+v*(t3-
m3*T3);
s2ayy8 =s2ay8+v*(t3-
m3*T3);
s3ayy8 =s3ay8+v*(t3-
m3*T3);
else
end

if
(m3*T3<=t3) & (t3<m3*T3+at9
1)
ayy9 =ay9+v*(t3-m3*T3);
slayy9 =slay9+v*(t3-
m3*T3);
s2ayy9 =s2ay9+v*(t3-
m3*T3);
s3ayy9 =s3ay9+v*(t3-
m3*T3);
else
end
if
(m3*T3<=t3) & (t3<m3*T3+at1
01)
ayy10 =ay10+v*(t3-m3*T3);
slayy10 =slay10+v*(t3-
m3*T3);
s2ayy10 =s2ay10+v*(t3-
m3*T3);
s3ayy10 =s3ay10+v*(t3-
m3*T3);
else
end

% 2ο tmhma kinisis

if
(m3*T3+at11<=t3) & (t3<m3*T
3+at11+at12)
ayy1 =0.4*y00+1+v*(t3-
at11-m3*T3);
slayy1
=0.4*s1y00+1+v*(t3-at11-
m3*T3);
s2ayy1
=0.4*s2y00+1+v*(t3-at11-
m3*T3);
s3ayy1
=0.4*s3y00+1+v*(t3-at11-
m3*T3);
else
end

if
(m3*T3+at21<=t3) & (t3<m3*T
3+at21+at22)
ayy2 =0.7*y00+1.1+v*(t3-
at21-m3*T3);
slayy2
=0.4*s1y00+1+v*(t3-at21-
m3*T3);
s2ayy2
=0.4*s2y00+1+v*(t3-at21-
m3*T3);
s3ayy2
=0.4*s3y00+1+v*(t3-at21-
m3*T3);
else
end

if
(m3*T3+at31<=t3) & (t3<m3*T
3+at31+at32)
ayy3 =0.6*y00+1.3+v*(t3-
at31-m3*T3);
slayy3
=0.4*s1y00+1+v*(t3-at31-
m3*T3);
s2ayy3
=0.4*s2y00+1+v*(t3-at31-
m3*T3);
s3ayy3
=0.4*s3y00+1+v*(t3-at31-
m3*T3);
else
end

if
(m3*T3+at41<=t3) & (t3<m3*T
3+at41+at42)
ayy4 =0.5*y00+1.4+v*(t3-
at41-m3*T3);

```

```
s1ayy4
=0.4*s1y00+1+v*(t3-at41-
m3*T3);
s2ayy4
=0.4*s2y00+1+v*(t3-at41-
m3*T3);
s3ayy4
=0.4*s3y00+1+v*(t3-at41-
m3*T3);
else
end

if
(m3*T3+at51<=t3) & (t3<m3*T
3+at51+at52)
ayy5 =0.54*y00+1.5+v*(t3-
at51-m3*T3);
s1ayy5
=0.4*s1y00+1+v*(t3-at51-
m3*T3);
s2ayy5
=0.4*s2y00+1+v*(t3-at51-
m3*T3);
s3ayy5
=0.4*s3y00+1+v*(t3-at51-
m3*T3);
else
end

if
(m3*T3+at61<=t3) & (t3<m3*T
3+at61+at62)
ayy6 =0.59*y00+1.6+v*(t3-
at61-m3*T3);
s1ayy6
=0.4*s1y00+1+v*(t3-at61-
m3*T3);
s2ayy6
=0.4*s2y00+1+v*(t3-at61-
m3*T3);
s3ayy6
=0.4*s3y00+1+v*(t3-at61-
m3*T3);
else
end

if
(m3*T3+at71<=t3) & (t3<m3*T
3+at71+at72)
ayy7 =0.65*y00+1.9+v*(t3-
at71-m3*T3);
s1ayy7
=0.4*s1y00+1+v*(t3-at71-
m3*T3);
s2ayy7
=0.4*s2y00+1+v*(t3-at71-
m3*T3);
s3ayy7
=0.4*s3y00+1+v*(t3-at71-
m3*T3);

else
end

if
(m3*T3+at81<=t3) & (t3<m3*T
3+at81+at82)
ayy8
=0.29*y00+1.45+v*(t3-
at81-m3*T3);
s1ayy8
=0.4*s1y00+1+v*(t3-at81-
m3*T3);
s2ayy8
=0.4*s2y00+1+v*(t3-at81-
m3*T3);
s3ayy8
=0.4*s3y00+1+v*(t3-at81-
m3*T3);
else
end

if
(m3*T3+at91<=t3) & (t3<m3*T
3+at91+at92)
ayy9
=0.33*y00+1.34+v*(t3-
at91-m3*T3);
s1ayy9
=0.4*s1y00+1+v*(t3-at91-
m3*T3);
s2ayy9
=0.4*s2y00+1+v*(t3-at91-
m3*T3);
s3ayy9
=0.4*s3y00+1+v*(t3-at91-
m3*T3);
else
end

if
(m3*T3+at101<=t3) & (t3<m3*
T3+at101+at102)
ayy10
=0.4*y00+1.53+v*(t3-
at101-m3*T3);
s1ayy10
=0.4*s1y00+1+v*(t3-at101-
m3*T3);
s2ayy10
=0.4*s2y00+1+v*(t3-at101-
m3*T3);
s3ayy10
=0.4*s3y00+1+v*(t3-at101-
m3*T3);
else
end
```

```

% KINHSH IODWN % KINHSH
IODWN % KINHSH IODWN

% 1ο τμήμα kinisis
if (m*T<=t) & (t<m*T+t11)
xx1 =x1+v*(t-m*T);
s1xx1 =s1x1+v*(t-m*T);
s2xx1 =s2x1+v*(t-m*T);
s3xx1 =s3x1+v*(t-m*T);
s4xx1 =s4x1+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t21)
xx2 =x2+v*(t-m*T);
s1xx2 =s1x2+v*(t-m*T);
s2xx2 =s2x2+v*(t-m*T);
s3xx2 =s3x2+v*(t-m*T);
s4xx2 =s4x2+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t31)
xx3 =x3+v*(t-m*T);
s1xx3 =s1x3+v*(t-m*T);
s2xx3 =s2x3+v*(t-m*T);
s3xx3 =s3x3+v*(t-m*T);
s4xx3 =s4x3+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t41)
xx4 =x4+v*(t-m*T);
s1xx4 =s1x4+v*(t-m*T);
s2xx4 =s2x4+v*(t-m*T);
s3xx4 =s3x4+v*(t-m*T);
s4xx4 =s4x4+v*(t-m*T);
else
end
if (m*T<=t) & (t<m*T+t51)
xx5 =x5+v*(t-m*T);
s1xx5 =s1x5+v*(t-m*T);
s2xx5 =s2x5+v*(t-m*T);
s3xx5 =s3x5+v*(t-m*T);
s4xx5 =s4x5+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t61)
xx6 =x6+v*(t-m*T);
s1xx6 =s1x6+v*(t-m*T);
s2xx6 =s2x6+v*(t-m*T);
s3xx6 =s3x6+v*(t-m*T);
s4xx6 =s4x6+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t71)
xx7 =x7+v*(t-m*T);
s1xx7 =s1x7+v*(t-m*T);
s2xx7 =s2x7+v*(t-m*T);
s3xx7 =s3x7+v*(t-m*T);
s4xx7 =s4x7+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t81)
xx8 =x8+v*(t-m*T);
s1xx8 =s1x8+v*(t-m*T);
s2xx8 =s2x8+v*(t-m*T);
s3xx8 =s3x8+v*(t-m*T);
s4xx8 =s4x8+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t91)
xx9 =x9+v*(t-m*T);
s1xx9 =s1x9+v*(t-m*T);
s2xx9 =s2x9+v*(t-m*T);
s3xx9 =s3x9+v*(t-m*T);
s4xx9 =s4x9+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t101)
xx10 =x10+v*(t-m*T);
s1xx10 =s1x10+v*(t-m*T);
s2xx10 =s2x10+v*(t-m*T);
s3xx10 =s3x10+v*(t-m*T);
s4xx10 =s4x10+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t111)
xx11 =x11+v*(t-m*T);
s1xx11 =s1x11+v*(t-m*T);
s2xx11 =s2x11+v*(t-m*T);
s3xx11 =s3x11+v*(t-m*T);
s4xx11 =s4x11+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t121)
xx12 =x12+v*(t-m*T);
s1xx12 =s1x12+v*(t-m*T);
s2xx12 =s2x12+v*(t-m*T);
s3xx12 =s3x12+v*(t-m*T);
s4xx12 =s4x12+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t131)
xx13 =x13+v*(t-m*T);
s1xx13 =s1x13+v*(t-m*T);
s2xx13 =s2x13+v*(t-m*T);

```

```

s3xx13 =s3x13+v*(t-m*T);
s4xx13 =s4x13+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t141)
xx14 =x14+v*(t-m*T);
s1xx14 =s1x14+v*(t-m*T);
s2xx14 =s2x14+v*(t-m*T);
s3xx14 =s3x14+v*(t-m*T);
s4xx14 =s4x14+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t151)
xx15 =x15+v*(t-m*T);
s1xx15 =s1x15+v*(t-m*T);
s2xx15 =s2x15+v*(t-m*T);
s3xx15 =s3x15+v*(t-m*T);
s4xx15 =s4x15+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t161)
xx16 =x16+v*(t-m*T);
s1xx16 =s1x16+v*(t-m*T);
s2xx16 =s2x16+v*(t-m*T);
s3xx16 =s3x16+v*(t-m*T);
s4xx16 =s4x16+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t171)
xx17 =x17+v*(t-m*T);
s1xx17 =s1x17+v*(t-m*T);
s2xx17 =s2x17+v*(t-m*T);
s3xx17 =s3x17+v*(t-m*T);
s4xx17 =s4x17+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t181)
xx18 =x18+v*(t-m*T);
s1xx18 =s1x18+v*(t-m*T);
s2xx18 =s2x18+v*(t-m*T);
s3xx18 =s3x18+v*(t-m*T);
s4xx18 =s4x18+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t191)
xx19 =x19+v*(t-m*T);
s1xx19 =s1x19+v*(t-m*T);
s2xx19 =s2x19+v*(t-m*T);
s3xx19 =s3x19+v*(t-m*T);
s4xx19 =s4x19+v*(t-m*T);
else
end

if (m*T<=t) & (t<m*T+t201)
xx20 =x20+v*(t-m*T);
s1xx20 =s1x20+v*(t-m*T);
s2xx20 =s2x20+v*(t-m*T);
s3xx20 =s3x20+v*(t-m*T);
s4xx20 =s4x20+v*(t-m*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t11)
xxx1 =wx1+v*(tt-m1*T);
s1xxx1 =s1wx1+v*(tt-
m1*T);
s2xxx1 =s2wx1+v*(tt-
m1*T);
s3xxx1 =s3wx1+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t21)
xxx2 =wx2+v*(tt-m1*T);
s1xxx2 =s1wx2+v*(tt-
m1*T);
s2xxx2 =s2wx2+v*(tt-
m1*T);
s3xxx2 =s3wx2+v*(tt-
m1*T);
else
end
%
if
(m1*T<=tt) & (tt<m1*T+t31)
xxx3 =wx3+v*(tt-m1*T);
s1xxx3 =s1wx3+v*(tt-
m1*T);
s2xxx3 =s2wx3+v*(tt-
m1*T);
s3xxx3 =s3wx3+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t41)
xxx4 =wx4+v*(tt-m1*T);
s1xxx4 =s1wx4+v*(tt-
m1*T);
s2xxx4 =s2wx4+v*(tt-
m1*T);
s3xxx4 =s3wx4+v*(tt-
m1*T);
else
end

```

```
if
(m1*T<=tt) & (tt<m1*T+t51)
xxx5 =wx5+v*(tt-m1*T);
s1xxx5 =s1wx5+v*(tt-
m1*T);
s2xxx5 =s2wx5+v*(tt-
m1*T);
s3xxx5 =s3wx5+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t61)
xxx6 =wx6+v*(tt-m1*T);
s1xxx6=s1wx6+v*(tt-m1*T);
s2xxx6 =s2wx6+v*(tt-
m1*T);
s3xxx6 =s3wx6+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t71)
xxx7 =wx7+v*(tt-m1*T);
s1xxx7 =s1wx7+v*(tt-
m1*T);
s2xxx7 =s2wx7+v*(tt-
m1*T);
s3xxx7 =s3wx7+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t81)
xxx8 =wx8+v*(tt-m1*T);
s1xxx8 =s1wx8+v*(tt-
m1*T);
s2xxx8 =s2wx8+v*(tt-
m1*T);
s3xxx8 =s3wx8+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t91)
xxx9 =wx9+v*(tt-m1*T);
s1xxx9 =s1wx9+v*(tt-
m1*T);
s2xxx9 =s2wx9+v*(tt-
m1*T);
s3xxx9=s3wx9+v*(tt-m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t101)
xxx10 =wx10+v*(tt-m1*T);
s1xxx10 =s1wx10+v*(tt-
m1*T);
s2xxx10 =s2wx10+v*(tt-
m1*T);
s3xxx10 =s3wx10+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t111)
xxx11 =wx11+v*(tt-m1*T);
s1xxx11 =s1wx11+v*(tt-
m1*T);
s2xxx11 =s2wx11+v*(tt-
m1*T);
s3xxx11 =s3wx11+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t121)
xxx12 =wx12+v*(tt-m1*T);
s1xxx12 =s1wx12+v*(tt-
m1*T);
s2xxx12 =s2wx12+v*(tt-
m1*T);
s3xxx12 =s3wx12+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t131)
xxx13 =wx13+v*(tt-m1*T);
s1xxx13 =s1wx13+v*(tt-
m1*T);
s2xxx13 =s2wx13+v*(tt-
m1*T);
s3xxx13 =s3wx13+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t141)
xxx14 =wx14+v*(tt-m1*T);
s1xxx14 =s1wx14+v*(tt-
m1*T);
s2xxx14 =s2wx14+v*(tt-
m1*T);
s3xxx14 =s3wx14+v*(tt-
m1*T);
else
```

```

end

if
(m1*T<=tt) & (tt<m1*T+t151)
xxx15 =wx15+v*(tt-m1*T);
s1xxx15 =s1wx15+v*(tt-
m1*T);
s2xxx15 =s2wx15+v*(tt-
m1*T);
s3xxx15 =s3wx15+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t161)
xxx16 =wx16+v*(tt-m1*T);
s1xxx16 =s1wx16+v*(tt-
m1*T);
s2xxx16 =s2wx16+v*(tt-
m1*T);
s3xxx16 =s3wx16+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t171)
xxx17 =wx17+v*(tt-m1*T);
s1xxx17 =s1wx17+v*(tt-
m1*T);
s2xxx17 =s2wx17+v*(tt-
m1*T);
s3xxx17 =s3wx17+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t181)
xxx18 =wx18+v*(tt-m1*T);
s1xxx18 =s1wx18+v*(tt-
m1*T);
s2xxx18 =s2wx18+v*(tt-
m1*T);
s3xxx18 =s3wx18+v*(tt-
m1*T);
else
end

if
(m1*T<=tt) & (tt<m1*T+t191)
xxx19 =wx19+v*(tt-m1*T);
s1xxx19 =s1wx19+v*(tt-
m1*T);
s2xxx19 =s2wx19+v*(tt-
m1*T);
s3xxx19 =s3wx19+v*(tt-
m1*T);

else
end

if
(m1*T<=tt) & (tt<m1*T+t201)
xxx20 =wx20+v*(tt-m1*T);
s1xxx20 =s1wx20+v*(tt-
m1*T);
s2xxx20 =s2wx20+v*(tt-
m1*T);
s3xxx20 =s3wx20+v*(tt-
m1*T);
else
end

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
%
%      % 2ο τμήμα kinisis
%
if
(m*T+t11<=t) & (t<m*T+t11+t
12)
xx1 =x00+2+v*(t-t11-m*T);
s1xx1 =s1x00+2+v*(t-t11-
m*T);
s2xx1 =s2x00+2+v*(t-t11-
m*T);
s3xx1 =s3x00+2+v*(t-t11-
m*T);
s4xx1 =s4x00+2+v*(t-t11-
m*T);
else
end

if
(m*T+t21<=t) & (t<m*T+t21+t
22)
xx2 =x00+2+v*(t-t21-m*T);
s1xx2 =s1x00+2+v*(t-t21-
m*T);
s2xx2 =s2x00+2+v*(t-t21-
m*T);
s3xx2 =s3x00+2+v*(t-t21-
m*T);
s4xx2 =s4x00+2+v*(t-t21-
m*T);
else
end

if
(m*T+t31<=t) & (t<m*T+t31+t
32)
xx3 =x00+2+v*(t-t31-m*T);
s1xx3 =s1x00+2+v*(t-t31-
m*T);

```

```

s2xx3 =s2x00+2+v*(t-t31-
m*T);
s3xx3 =s3x00+2+v*(t-t31-
m*T);
s4xx3 =s4x00+2+v*(t-t31-
m*T);
else
end

if
(m*T+t41<=t) & (t<m*T+t41+t
42)
xx4 =x00+2+v*(t-t41-m*T);
s1xx4 =s1x00+2+v*(t-t41-
m*T);
s2xx4 =s2x00+2+v*(t-t41-
m*T);
s3xx4 =s3x00+2+v*(t-t41-
m*T);
s4xx4 =s4x00+2+v*(t-t41-
m*T);
else
end

if
(m*T+t51<=t) & (t<m*T+t51+t
52)
xx5 =x00+2+v*(t-t51-m*T);
s1xx5 =s1x00+2+v*(t-t51-
m*T);
s2xx5 =s2x00+2+v*(t-t51-
m*T);
s3xx5 =s3x00+2+v*(t-t51-
m*T);

if (m*T+t81<=t) & (t<m*T+t81+t82)
xx8 =x00+2+v*(t-t81-m*T);
s1xx8 =s1x00+2+v*(t-t81-m*T);
s2xx8 =s2x00+2+v*(t-t81-m*T);
s3xx8 =s3x00+2+v*(t-t81-m*T);
s4xx8 =s4x00+2+v*(t-t81-m*T);
else
end

if (m*T+t91<=t) & (t<m*T+t91+t92)
xx9 =x00+2+v*(t-t91-m*T);
s1xx9 =s1x00+2+v*(t-t91-
m*T);
s2xx9 =s2x00+2+v*(t-t91-
m*T);
s3xx9 =s3x00+2+v*(t-t91-
m*T);
s4xx9 =s4x00+2+v*(t-t91-
m*T);
else
end

s4xx5 =s4x00+2+v*(t-t51-
m*T);
else
end

if
(m*T+t61<=t) & (t<m*T+t61+t
62)
xx6 =x00+2+v*(t-t61-m*T);
s1xx6 =s1x00+2+v*(t-t61-
m*T);
s2xx6 =s2x00+2+v*(t-t61-
m*T);
s3xx6 =s3x00+2+v*(t-t61-
m*T);
s4xx6 =s4x00+2+v*(t-t61-
m*T);
else
end

if
(m*T+t71<=t) & (t<m*T+t71+t
72)
xx7 =x00+2+v*(t-t71-m*T);
s1xx7 =s1x00+2+v*(t-t71-
m*T);
s2xx7 =s2x00+2+v*(t-t71-
m*T);
s3xx7 =s3x00+2+v*(t-t71-
m*T);
s4xx7 =s4x00+2+v*(t-t71-
m*T);
else
end

end

if
(m*T+t101<=t) & (t<m*T+t101
+t102)
xx10 =x00+2+v*(t-t101-
m*T);

```

```

s1xx10 =s1x00+2+v*(t-
t101-m*T);
s2xx10 =s2x00+2+v*(t-
t101-m*T);
s3xx10 =s3x00+2+v*(t-
t101-m*T);
s4xx10 =s4x00+2+v*(t-
t101-m*T);
else
end

if
(m*T+t111<=t) & (t<m*T+t111
+t112)
xx11 =x00+2+v*(t-t111-
m*T);
s1xx11 =s1x00+2+v*(t-
t111-m*T);
s2xx11 =s2x00+2+v*(t-
t111-m*T);
s3xx11 =s3x00+2+v*(t-
t111-m*T);
s4xx11 =s4x00+2+v*(t-
t111-m*T);
else
end

if
(m*T+t121<=t) & (t<m*T+t121
+t122)
xx12 =x00+2+v*(t-t121-
m*T);
s1xx12 =s1x00+2+v*(t-
t121-m*T);
s2xx12 =s2x00+2+v*(t-
t121-m*T);
s3xx12 =s3x00+2+v*(t-
t121-m*T);
s4xx12 =s4x00+2+v*(t-
t121-m*T);
else
end

if
(m*T+t131<=t) & (t<m*T+t131
+t132)
xx13 =x00+2+v*(t-t131-
m*T);
s1xx13 =s1x00+2+v*(t-
t131-m*T);
s2xx13 =s2x00+2+v*(t-
t131-m*T);
s3xx13 =s3x00+2+v*(t-
t131-m*T);
s4xx13 =s4x00+2+v*(t-
t131-m*T);
else
end

if
(m*T+t141<=t) & (t<m*T+t141
+t142)
xx14 =x00+2+v*(t-t141-
m*T);
s1xx14 =s1x00+2+v*(t-
t141-m*T);
s2xx14 =s2x00+2+v*(t-
t141-m*T);
s3xx14 =s3x00+2+v*(t-
t141-m*T);
s4xx14 =s4x00+2+v*(t-
t141-m*T);
else
end

if
(m*T+t151<=t) & (t<m*T+t151
+t152)
xx15 =x00+2+v*(t-t151-
m*T);
s1xx15 =s1x00+2+v*(t-
t151-m*T);
s2xx15 =s2x00+2+v*(t-
t151-m*T);
s3xx15 =s3x00+2+v*(t-
t151-m*T);
s4xx15 =s4x00+2+v*(t-
t151-m*T);
else
end

if
(m*T+t161<=t) & (t<m*T+t161
+t162)
xx16 =x00+2+v*(t-t161-
m*T);
s1xx16 =s1x00+2+v*(t-
t161-m*T);
s2xx16 =s2x00+2+v*(t-
t161-m*T);
s3xx16 =s3x00+2+v*(t-
t161-m*T);
s4xx16 =s4x00+2+v*(t-
t161-m*T);
ex16=2+v*(t-t161-m*T);
else
end

if
(m*T+t171<=t) & (t<m*T+t171
+t172)
xx17 =x00+2+v*(t-t171-
m*T);
s1xx17 =s1x00+2+v*(t-
t171-m*T);
s2xx17 =s2x00+2+v*(t-
t171-m*T);

```



```
s3xx17 =s3x00+2+v*(t-
t171-m*T);
s4xx17 =s4x00+2+v*(t-
t171-m*T);
else
end

if
(m*T+t181<=t) & (t<m*T+t181
+t182)
xx18 =x00+2+v*(t-t181-
m*T);
s1xx18 =s1x00+2+v*(t-
t181-m*T);
s2xx18 =s2x00+2+v*(t-
t181-m*T);
s3xx18 =s3x00+2+v*(t-
t181-m*T);
s4xx18 =s4x00+2+v*(t-
t181-m*T);
else
end

if
(m*T+t191<=t) & (t<m*T+t191
+t192)
xx19 =x00+2+v*(t-t191-
m*T);
s1xx19 =s1x00+2+v*(t-
t191-m*T);
s2xx19 =s2x00+2+v*(t-
t191-m*T);
s3xx19 =s3x00+2+v*(t-
t191-m*T);
s4xx19 =s4x00+2+v*(t-
t191-m*T);
else
end

if
(m*T+t201<=t) & (t<m*T+t201
+t202)
xx20 =x00+2+v*(t-t201-
m*T);
s1xx20 =s1x00+2+v*(t-
t201-m*T);
s2xx20 =s2x00+2+v*(t-
t201-m*T);
s3xx20 =s3x00+2+v*(t-
t201-m*T);
s4xx20 =s4x00+2+v*(t-
t201-m*T);
else
end

if
(m1*T+t11<=tt) & (tt<m1*T+t
11+t12)
xxx1 =wx00+2+v*(tt-t11-
m1*T);
s1xxx1 =s1wx00+2+v*(tt-
t11-m1*T);
s2xxx1 =s2wx00+2+v*(tt-
t11-m1*T);
s3xxx1 =s3wx00+2+v*(tt-
t11-m1*T);
else
end

if
(m1*T+t21<=tt) & (tt<m1*T+t
21+t22)
xxx2 =wx00+2+v*(tt-t21-
m1*T);
s1xxx2 =s1wx00+2+v*(tt-
t21-m1*T);
s2xxx2 =s2wx00+2+v*(tt-
t21-m1*T);
s3xxx2 =s3wx00+2+v*(tt-
t21-m1*T);
else
end

if
(m1*T+t31<=tt) & (tt<m1*T+t
31+t32)
xxx3 =wx00+2+v*(tt-t31-
m1*T);
s1xxx3 =s1wx00+2+v*(tt-
t31-m1*T);
s2xxx3 =s2wx00+2+v*(tt-
t31-m1*T);
s3xxx3 =s3wx00+2+v*(tt-
t31-m1*T);
else
end

if
(m1*T+t41<=tt) & (tt<m1*T+t
41+t42)
xxx4 =wx00+2+v*(tt-t41-
m1*T);
s1xxx4 =s1wx00+2+v*(tt-
t41-m1*T);
s2xxx4 =s2wx00+2+v*(tt-
t41-m1*T);
s3xxx4 =s3wx00+2+v*(tt-
t41-m1*T);
else
end

if
(m1*T+t51<=tt) & (tt<m1*T+t
51+t52)
```

```

xxx5 =wx00+2+v*(tt-t51-
m1*T);
s1xxx5 =s1wx00+2+v*(tt-
t51-m1*T);
s2xxx5 =s2wx00+2+v*(tt-
t51-m1*T);
s3xxx5 =s3wx00+2+v*(tt-
t51-m1*T);
else
end

```

```

if
(m1*T+t61<=tt) & (tt<m1*T+t
61+t62)
xxx6 =wx00+2+v*(tt-t61-
m1*T);
s1xxx6 =s1wx00+2+v*(tt-
t61-m1*T);
s2xxx6 =s2wx00+2+v*(tt-
t61-m1*T);
s3xxx6 =s3wx00+2+v*(tt-
t61-m1*T);
else
end

```

```

if
(m1*T+t71<=tt) & (tt<m1*T+t
71+t72)
xxx7 =wx00+2+v*(tt-t71-
m1*T);
s1xxx7 =s1wx00+2+v*(tt-
t71-m1*T);
s2xxx7 =s2wx00+2+v*(tt-
t71-m1*T);
s3xxx7 =s3wx00+2+v*(tt-
t71-m1*T);
else
end

```

```

if
(m1*T+t81<=tt) & (tt<m1*T+t
81+t82)
xxx8 =wx00+2+v*(tt-t81-
m1*T);
s1xxx8 =s1wx00+2+v*(tt-
t81-m1*T);
s2xxx8 =s2wx00+2+v*(tt-
t81-m1*T);
s3xxx8 =s3wx00+2+v*(tt-
t81-m1*T);
else
end

```

```

if
(m1*T+t91<=tt) & (tt<m1*T+t
91+t92)

```

```

xxx9 =wx00+2+v*(tt-t91-
m1*T);
s1xxx9 =s1wx00+2+v*(tt-
t91-m1*T);
s2xxx9 =s2wx00+2+v*(tt-
t91-m1*T);
s3xxx9 =s3wx00+2+v*(tt-
t91-m1*T);
else
end

```

```

if
(m1*T+t101<=tt) & (tt<m1*T+
t101+t102)
xxx10 =wx00+2+v*(tt-t101-
m1*T);
s1xxx10 =s1wx00+2+v*(tt-
t101-m1*T);
s2xxx10 =s2wx00+2+v*(tt-
t101-m1*T);
s3xxx10 =s3wx00+2+v*(tt-
t101-m1*T);
else
end

```

```

if
(m1*T+t111<=tt) & (tt<m1*T+
t111+t112)
xxx11 =wx00+2+v*(tt-t111-
m1*T);
s1xxx11 =s1wx00+2+v*(tt-
t111-m1*T);
s2xxx11 =s2wx00+2+v*(tt-
t111-m1*T);
s3xxx11 =s3wx00+2+v*(tt-
t111-m1*T);
else
end

```

```

if
(m1*T+t121<=tt) & (tt<m1*T+
t121+t122)
xxx12 =wx00+2+v*(tt-t121-
m1*T);
s1xxx12 =s1wx00+2+v*(tt-
t121-m1*T);
s2xxx12 =s2wx00+2+v*(tt-
t121-m1*T);
s3xxx12 =s3wx00+2+v*(tt-
t121-m1*T);
else
end

```

```

if
(m1*T+t131<=tt) & (tt<m1*T+
t131+t132)
xxx13 =wx00+2+v*(tt-t131-
m1*T);

```

```

s1xxx13 =s1wx00+2+v*(tt-
t131-m1*T);
s2xxx13 =s2wx00+2+v*(tt-
t131-m1*T);
s3xxx13 =s3wx00+2+v*(tt-
t131-m1*T);
else
end

if
(m1*T+t141<=tt) & (tt<m1*T+
t141+t142)
xxx14 =wx00+2+v*(tt-t141-
m1*T);
s1xxx14 =s1wx00+2+v*(tt-
t141-m1*T);
s2xxx14 =s2wx00+2+v*(tt-
t141-m1*T);
s3xxx14 =s3wx00+2+v*(tt-
t141-m1*T);
else
end

if
(m1*T+t151<=tt) & (tt<m1*T+
t151+t152)
xxx15 =wx00+2+v*(t-t151-
m1*T);
s1xxx15 =s1wx00+2+v*(tt-
t151-m1*T);
s2xxx15 =s2wx00+2+v*(tt-
t151-m1*T);
s3xxx15 =s3wx00+2+v*(tt-
t151-m1*T);
else
end

if
(m1*T+t161<=tt) & (tt<m1*T+
t161+t162)
xxx16 =wx00+2+v*(tt-t161-
m1*T);
s1xxx16 =s1wx00+2+v*(tt-
t161-m1*T);
s2xxx16 =s2wx00+2+v*(tt-
t161-m1*T);
s3xxx16 =s3wx00+2+v*(tt-
t161-m1*T);
else
end

if
(m1*T+t171<=tt) & (tt<m1*T+
t171+t172)
xxx17 =wx00+2+v*(tt-t171-
m1*T);
s1xxx17 =s1wx00+2+v*(tt-
t171-m1*T);

```

```

s2xxx17 =s2wx00+2+v*(tt-
t171-m1*T);
s3xxx17 =s3wx00+2+v*(tt-
t171-m1*T);
else
end

if
(m1*T+t181<=tt) & (tt<m1*T+
t181+t182)
xxx18 =wx00+2+v*(tt-t181-
m1*T);
s1xxx18 =s1wx00+2+v*(tt-
t181-m1*T);
s2xxx18 =s2wx00+2+v*(tt-
t181-m1*T);
s3xxx18 =s3wx00+2+v*(tt-
t181-m1*T);
else
end

if
(m1*T+t191<=tt) & (tt<m1*T+
t191+t192)
xxx19 =wx00+2+v*(tt-t191-
m1*T);
s1xxx19 =s1wx00+2+v*(tt-
t191-m1*T);
s2xxx19 =s2wx00+2+v*(tt-
t191-m1*T);
s3xxx19 =s3wx00+2+v*(tt-
t191-m1*T);
else
end

if
(m1*T+t201<=tt) & (tt<m1*T+
t201+t202)
xxx20 =wx00+2+v*(tt-t201-
m1*T);
s1xxx20 =s1wx00+2+v*(tt-
t201-m1*T);
s2xxx20 =s2wx00+2+v*(tt-
t201-m1*T);
s3xxx20 =s3wx00+2+v*(tt-
t201-m1*T);
else
end
% %
fill(ypovx, ypovy, [0.9
0.9 0.9] ,...
basx1, basy1, [0.76 0.36
0] ,...
basbx1, basby1, [0.6 0.2
0] ,...
bascx1, bascy1, [0.8 0.4
0] ,...
basx2, basy2, [0.76 0.36
0] ,...

```

```

basbx2, basby2, [((0.6-
0.9)*t/tol)+0.9
(0.2/tol)*t 0] ,...
bascx2, bascy2, [0.8 0.4
0] ,...
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s4xx1, s4y1, [0.6 0.9
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0.3],...
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0.4],...
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0.5],...
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0.6],...
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xx3, y3, [0.2 0.7
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0.3],...
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0.4],...
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0.5],...
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0.4],...
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0.3],...
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s1xxx7, s1wy7, [0.9 0.2
0.2],...

```

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```

```

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0.7],...
'LineStyle','none')
axis([1.7 3.2 0.75 2.5]);
axis off
text(1.9 , 2.35, '+','FontSize',20)
text(1.85 , 2.27, 'ΑΝΟΔΟΣ','FontSize',12)
text(2.95 , 2.35, '-','FontSize',22)
text(2.85 , 2.27, 'ΚΑΘΟΔΟΣ','FontSize',12)
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s3ax6, s3ayy6, [0.8 1
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0.6],...
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0.95 0.7],...
s3ax10, s3ayy10, [0.8 1
0.5],...
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0.5],...
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0.6],...
s2fysx, s2fysy , [0.7
0.95 0.7],...
s3fysx, s3fysy , [0.8 1
0.8],...

```

```
text(2.1 , 1.02, 'Παρατηρούμε την κίνηση ιόντων σε διάλυμα  
χλωριούχου νατρίου', 'FontSize',9)  
text(2.1 , 0.95, 'Τα θετικά ιόντα του Na έλκονται από την  
κάθοδο', 'FontSize',9)  
text(2.1 , 0.88, 'Τα αρνητικά ιόντα του Cl έλκονται από την  
άνοδο', 'FontSize',9)  
text(2.1 , 0.81, 'Φυσαλίδες Cl εμφανίζονται στην  
άνοδο', 'FontSize',9)  
  
text(2.4 , 2.3, 'Na', 'FontSize',12)  
text(2.4 , 2.405, 'Cl', 'FontSize',12)  
text(2.45 , 2.315, '+', 'FontSize',10)  
text(2.45 , 2.43, '-', 'FontSize',16)  
text(2.4 , 2.21, 'Φυσαλίδες χλωρίου', 'FontSize',10)  
pause(ryte)  
end  
  
set(handles.pushbutton5, 'enable', 'on')  
set(handles.pushbutton6, 'enable', 'on')  
  
% --- Executes on button press in pushbutton3.  
function pushbutton3_Callback(hObject, eventdata, handles)  
% hObject handle to pushbutton3 (see GCBO)  
% eventdata reserved - to be defined in a future version of  
MATLAB  
% handles structure with handles and user data (see GUIDATA)  
global stam;  
  
if (stam==0)  
set(handles.pushbutton3, 'string', 'Συνέχεια')  
set(handles.pushbutton5, 'enable', 'on')  
set(handles.pushbutton6, 'enable', 'on')  
stam=1;  
elseif (stam==1)  
set(handles.pushbutton3, 'string', 'Διακοπή')  
set(handles.pushbutton5, 'enable', 'off')  
set(handles.pushbutton6, 'enable', 'off')  
stam=0;  
else  
end  
guidata(hObject, handles);  
  
% --- Executes on button press in pushbutton4.  
% function pushbutton4_Callback(hObject, eventdata, handles)  
% % hObject handle to pushbutton4 (see GCBO)  
% % eventdata reserved - to be defined in a future version of  
MATLAB  
% % handles structure with handles and user data (see  
GUIDATA)  
% global suv;  
% global stam;  
% suv=get(handles.pushbutton4, 'value');  
% stam=0;  
  
% --- Executes on button press in pushbutton5.  
function pushbutton5_Callback(hObject, eventdata, handles)  
% hObject handle to pushbutton5 (see GCBO)
```



```
% eventdata reserved - to be defined in a future version of
MATLAB
% handles structure with handles and user data (see GUIDATA)
global ryt;
global status;
status=1;
axes(handles.axes1)
cla
clear ryt;
set(handles.edit1,'enable','on','string','5');
set(handles.pushbutton2,'enable','on')
guidata(hObject, handles);
% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton6 (see GCBO)
% eventdata reserved - to be defined in a future version of
MATLAB
% handles structure with handles and user data (see GUIDATA)
global status;
global stam;
hfin=questdlg('Έξοδος από το πρόγραμμα;');
switch hfin
case 'Yes'
stam=1;
status=1;
closereq;
end
% --- Executes on button press in pushbutton7.
function pushbutton7_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton7 (see GCBO)
% eventdata reserved - to be defined in a future version of
MATLAB
% handles structure with handles and user data (see GUIDATA)
! help_eik_3_18.pdf;
```

ΒΙΒΛΙΟΓΡΑΦΙΑ

Έντυπη

- Matlab – GraphicalUserInterfaces Δημήτριος Βαρσάμης
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- Matlab GUI Tutorial by Chaltez Heck

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