ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΣΕΡΡΩΝ

ΣΧΟΛΗ ΤΕΧΝΟΛΟΓΙΚΩΝ ΕΦΑΡΜΟΓΩΝ

ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ ΠΛΗΡΟΦΟΡΙΚΗΣ

Πτυχιακή Εργασία

Θέμα:

Κατασκευή διδακτικού πακέτου προσομοίωσης της ευθύγραμμης ομαλά μεταβαλλόμενης κίνησης στο MaTLaB .

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2016

Ευχαριστίες

Κατά κύριο λόγο, οφείλω να εκφράσω τις θερμές μου ευχαριστίες στον επιβλέποντα Καθηγητή κ Κουϊρουκίδη Απόστολο, ο οποίος προσέφερε το ενδιαφέρον θέμα και μου έδειξε εμπιστοσύνη δίνοντάς μου τη δυνατότητα να εκπονήσω την πτυχιακή μου εργασία. Τον ευχαριστώ επίσης για τις πολύτιμες γνώσεις και συμβουλές που μου παρείχε καθ’ όλη τη διάρκεια της εργασίας, καθώς και για την απρόσκοπτη υποστήριξη και καθοδήγηση που μου παρείχε καθ’ όλη τη διάρκεια των σπουδών μου.

Τέλος, θα ήθελα επίσης να απευθύνω τις ευχαριστίες μου στους γονείς μου, οι οποίοι στήριξαν τις σπουδές μου με διάφορους τρόπους, φροντίζοντας για την καλύτερη δυνατή μόρφωση μου και τους φίλους μου για την κατανόηση και τη συμπαράστασή τους.

Με εκτίμηση,

Ράλλη Γεωργία

ΠΡΟΛΟΓΟΣ ΚΑΙ ΠΕΡΙΛΗΨΗ ΠΤΥΧΙΑΚΉΣ ΕΡΓΑΣΙΑΣ

Στην πτυχιακή αυτή εργασία κατασκευάστηκε ένα ολοκληρωμένο πρόγραμμα προσομοίωσης της Φυσικής για την Ευθύγραμμη Ομαλά Μεταβαλλόμενη Κίνηση, με σκοπό τη διευκόλυνση της διδασκαλίας με σύγχρονα οπτικά μέσα και μεθόδους αυτενέργειας και πειραματισμού, που θα δημιουργήσουν και θα ενισχύσουν το ενδιαφέρον των μαθητών προς το μάθημα.

Το πακέτο αυτό έχει διαδραστικό χαρακτήρα με αναλυτική ανάπτυξη της θεωρίας και προσομοιωμένο εργαστήριο για πειράματα πάνω στην Φυσική, σε όλο το δυνατό εύρος τιμών των παραμέτρων του προβλήματος.

ΠΕΡΙΕΧΟΜΕΝΑ:

Κεφάλαιο:1^{o} Κινήσεις

ΕΥΘΥΓΡΑΜΜΗ ΟΜΑΛΗ ΚΙΝΗΣΗ

Ευθύγραμμη ομαλή κίνηση: λέγεται η κίνηση που κάνει ένα σώμα κινούμενο πάνω σε μια ευθεία με σταθερή ταχύτητα. Εναλλακτικά, ορίζεται η κίνηση ενός σώματος που κινείται σε ευθεία γραμμή και σε ίσους χρόνους, διανύει ίσα διαστήματα.

Η ευθύγραμμη ομαλή κίνηση είναι ένα είδος κίνησης και επομένως χαρακτηρίζεται από τα τρία φυσικά μεγέθη της κίνησης. Ειδικότερα:

Θέση (χ)

Η θέση ενός σώματος χαρακτηρίζεται συνήθως από ένα διάνυσμα. Δηλώνει το που βρίσκεται αυτό σε σχέση με κάποια αρχή μέτρησης των συντεταγμένων. Στην ευθύγραμμη ομαλή κίνηση, η θέση μεταβάλλεται ανάλογα με τον χρόνο.

Ταχύτητα (u)

Η ταχύτητα είναι το φυσικό μέγεθος που εκφράζει το ρυθμό μεταβολής της θέσης του σώματος στη μονάδα του χρόνου. Εκφράζεται και αυτή από ένα διάνυσμα για να δηλώνεται η κατεύθυνση της κίνησης. Στην ευθύγραμμη ομαλή κίνηση η *ταχύτητα (v)* είναι σταθερή και η διεύθυνση της είναι παράλληλη με την ευθύγραμμη τροχιά της κίνησης.

Επιτάχυνση (α)

Η επιτάχυνση είναι το φυσικό μέγεθος που εκφράζει το ρυθμό μεταβολής της ταχύτητας του σώματος στη μονάδα του χρόνου. Στην ευθύγραμμη ομαλή κίνηση η *επιτάχυνση (a)* είναι μηδενική.

Τυπολόγιο:

Ταχύτητα:	u=x/t
Μετατόπιση:	x=u*t
Θέση (τελική):	$x=x_o + u*t$
Χρονική διάρκεια:	t=x/u

ΕΥΘΥΓΡΑΜΜΗ ΟΜΑΛΑ ΕΠΙΤΑΧΥΝΟΜΕΝΗ ΚΙΝΗΣΗ

Ευθύγραμμη ομαλά επιταχυνόμενη κίνηση: είναι η κίνηση που κάνει κάποιο σώμα στην οποία η τροχιά της είναι ευθύγραμμη και η επιτάχυνση της μένει σταθερή και διαφορετική από τη μηδενική. Κατά αυτόν τον τρόπο το σώμα επιταχύνεται με σταθερή επιτάχυνση, επομένως η ταχύτητα του αυξάνεται με σταθερό ρυθμό, αφού η επιτάχυνση είναι ουσιαστικά ο ρυθμός μεταβολής της ταχύτητα ως προς το χρόνο.

Η ευθύγραμμη ομαλά επιταχυνόμενη κίνηση χαρακτηρίζεται από τα τέσσερα φυσικά μεγέθη της κίνησης. Ειδικότερα:

Ταχύτητα (u)

Η ταχύτητα, είναι διανυσματικό μέγεθος με διεύθυνσή την τροχιά και φορά την φορά της κίνησης.

Επιτάχυνση (α)

Η επιτάχυνση, είναι επίσης διανυσματικό μέγεθος με διεύθυνσή την τροχιά της κίνησης.

Μετατόπιση (χ)

Η μετατόπιση, είναι το διανυσματικό μέγεθος που δηλώνει τη διαφορά της αρχικής θέσης του σώματος με την τρέχουσα ή τελική του θέση.

Χρόνος (t)

Ο χρόνος, είναι το μονόμετρο μέγεθος που δηλώνει τη διάρκεια για την οποία εξελίσσεται το φαινόμενο προς παρατήρηση. Συνήθως η αρχή της κίνησης επιλέγεται ως η χρονική στιγμή στην οποία ξεκινά να μετριέται ο χρόνος ($t = 0$).

Επιτάχυνση:	a=σταθερή (επιτάχυνση)
Ταχύτητα:	$u=u_o+a*t$
Μετατόπιση:	$x=u_o*t+(1/2)*a*t^2$
όπου $\mathbf{u_o}$ η αρχική ταχύτητα	

ΕΥΘΥΓΡΑΜΜΗ ΟΜΑΛΑ ΕΠΙΒΡΑΔΥΝΟΜΕΝΗ ΚΙΝΗΣΗ

Ευθύγραμμη ομαλά επιβραδυνόμενη κίνηση: είναι η κίνηση που κάνει κάποιο σώμα όταν η επιτάχυνση είναι αρνητική και η ταχύτητα μειώνεται με σταθερό ρυθμό.

Η ευθύγραμμη ομαλά επιβραδυνόμενη κίνηση χαρακτηρίζεται από τα τέσσερα φυσικά μεγέθη της κίνησης. Ειδικότερα:

Ταχύτητα (u)

Η ταχύτητα, είναι διανυσματικό μέγεθος με διεύθυνσή την τροχιά και φορά την φορά της κίνησης.

Επιτάχυνση (α)

Η επιτάχυνση, είναι επίσης διανυσματικό μέγεθος με διεύθυνσή την τροχιά της κίνησης.

Μετατόπιση (χ)

Η μετατόπιση, είναι το διανυσματικό μέγεθος που δηλώνει τη διαφορά της αρχικής θέσης του σώματος με την τρέχουσα ή τελική του θέση.

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Ο χρόνος, είναι το μονόμετρο μέγεθος που δηλώνει τη διάρκεια για την οποία εξελίσσεται το φαινόμενο προς παρατήρηση. Συνήθως η αρχή της κίνησης επιλέγεται ως η χρονική στιγμή στην οποία ξεκινά να μετριέται ο χρόνος ($t = 0$) .

Επιτάχυνση:	a=σταθερή (επιβράδυνση)
Ταχύτητα:	$u=u_o-a*t$
Μετατόπιση:	$x=u_o-(1/2)a*t^2$
Χρόνος:	$t=u_o /a$ [ολικός χρόνος κίνησης] $x_o =u_o{}^2 /(2*a)$ [ολικό διάστημα που διανύεται]

όπου $\mathbf{u_o}$ η αρχική ταχύτητα

Κεφάλαιο:2^{ο}

ΠΕΡΙΓΡΑΦΗ ΚΑΙ ΒΑΣΙΚΕΣ ΛΕΙΤΟΥΡΓΙΕΣ ΤΟΥ MATLAB

Γενικά η γλώσσα προγραμματισμού MATLAB (το όνομα προήλθε από τις λέξεις Matrix Laboratory) λειτουργεί ως διερμηνέας εντολών (command interpreter), οι οποίες δίνονται μέσω του παραθύρου εντολών της (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.

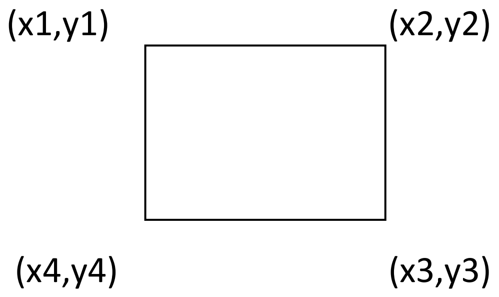
Οι πιο κύριες εντολές και μία χοντρική περιγραφή του κώδικα του Matlab που χρειάζονται και χρησιμοποιήθηκαν κυρίως στους κώδικες της εφαρμογής είναι οι παρακάτω:

1) **ΔΙΑΝΥΣΜΑΤΑ:**

```
>> x=[1,2,3,4,5,6]
```

2) **ΣΧΗΜΑΤΑ ΜΕ ΧΡΩΜΑ:**

```
xsquare=[x1,x2,x3,x4]
ysquare=[y1,y2,y3,y4]
```



```
 fill(xsquare,ysquare, [c1,c2,c3])
```
όπου

color=[c1,c2,c3] και 0<=c1,c2,c3<=1

c1=κόκκινο , c2=πράσινο, c3=μπλε

Παράδειγμα σε mfile:

```
>>xs=[1,2,2,1]
>>ys=[2,2,1,1]
>>fill(xs,ys,[0.7,0.3,0.2],... 'Linestyle','None')
>> axis([0,3,0,3])              axis([xmin,xmax,ymin,ymax])
>> axis off
>> text(1,2.2,'A','color',[0.8,0.2,0.2],'fontsize',12)
```

Στην αρχή μπορούμε να βάλουμε το

```
BACKGROUND:      xback=[x1,x2,x3,x4]
                 yback=[y1,y2,y3,y4]
```

σε ότι χρώμα θέλουμε

```
>> xback=[0,0,3,3]
>> yback=[0,3,3,0]
>> fill(xback,yback,[0.2,0.3,0.7],... xs,ys,[0.7,0.3,0.2],... 'Linestyle', 'None')
```

Και οι άξονες να είναι στο μέγεθος του background:

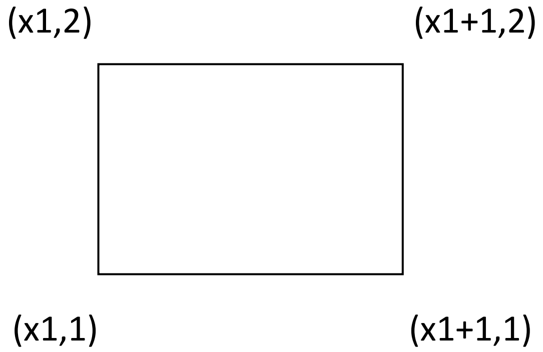
```
>> axis([0,3,0,3])
>>axis off
```

3) **ΚΙΝΗΣΗ ΣΧΗΜΑΤΩΝ:**

Ξανά παίρνουμε το τετράγωνο με πλευρά **1** και γράφουμε τα διανύσματα:

xsq=[x1,x1+1,x1+1,x1]

ysq=[1,1,2,2]



και κάνουμε_το **x1** να μεταβάλλεται μέσα σε μια εντολή **FOR**

```
>> for t=0:0.1:1           όπου step=0.1
>>x1=t*t;
>>xsq=[x1,x1+1,x1+1,x1]
>>ysq=[1,1,2,2]
>>fill(xsq,ysq,[0.7,0.3,0.2],...'Linestyle', 'None')
>>axis([0,3,0,3])
>> axis off
>> pause (ryt)     ρυθμός παύσης (μικρός αριθμός) π.χ  0.01
>> end
```

Όσο μικρότερο είναι το **ryt** τόσο πιο γρήγορα κινείται η προσομοίωση.

Όσο μεγαλύτερο είναι το **ryt** τόσο πιο αργά κινείται η προσομοίωση.

Όσο μεγαλύτερο το step τόσο πιο ομαλή η κίνηση (π.χ. 0.01).

Όταν το step είναι μεγάλο, τότε φαίνεται η κίνηση να κάνει ‘αλματάκια’ κάτι το οποίο δεν θέλουμε διότι είναι άσχημο.

Μπορούμε να δώσουμε και κίνηση στο **text**

π.χ >> text(x1,2.2,'A','color',[0.8,0.2,0.2],'fontsize',12)

4) **ΚΑΜΠΥΛΕΣ ΚΑΙ ΣΧΗΜΑΤΑ:**

Κάθε καμπύλη μπορούμε να τη ζωγραφίσουμε σαν ένα πολύγωνο με πολύ μικρό μήκος πλευράς.

```
>> xp[1,1.5,2,1.8,1.3]
>> yp=[1,1.2,1.5,2,1.7]
>> fill(xp,yp,[0.7,0.3,0.2],...,'Linestyle','None']
>> axis([0,3,0,3])
```

Για το σχήμα ΑΒΓΔ με την καμπύλη γράφουμε, επειδή είναι ημικύκλιο, μια παράμετρο γωνίας θ, από θ=π ξεκινώντας από το Α, μέχρι θ=0 στο Β, με πολύ μικρό step (π.χ 0.01) για να είναι ένα πολύγωνο με πολύ μικρές πλευρές (δηλ. μια ομαλή καμπύλη).

Άρα

xs=[xA, xP, xB, xΓ, xΔ]

ys=[yA, yP,yB, yΓ, yΔ]

οπότε:

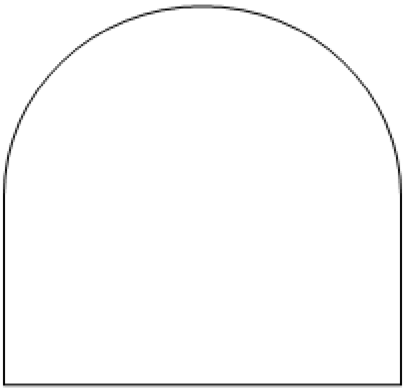
```
>> th=pi:-0.01:0;
>> xs=[1,1.5+0.5*cos(th),2,2,1];
>> ys=[2,2+0.5*sin(th),2,1,1];
>> fill(xs,ys,[0.7,0.3,0.2],...,'Linestyle','None')
>> axis([0,3,0,3])
```

(Βλ.σχήμα παρακάτω)

Σχήμα: **P(xP,yP)**

xp=1,5+0.5cosθ

(1,2)A **B(2,2)** yp=2+0.5sinθ



(1,1)Δ **Γ(2,1)**

Το κέντρο **O(1.5,2)** βρίσκεται ανάμεσα στο **A(1,2)** και **B(2,2)** , **OP=ρ=0.5** είναι η ακτίνα του ημικυκλίου και **θ** η γωνία της ακτίνας με τον οριζόντιο άξονα OB.

5) ΑΛΛΕΣ ΕΝΤΟΛΕΣ:

Μέσα στο κώδικα της σελ:10, αν βάλουμε την εντολή:

```
>>nx1=num2str(0.01*round(100*x1));
```

```
>>text(2.5,2.5,nx1)
```

Βγάζει την αριθμητική τιμή της μεταβλητής x1 όπου θέλουμε

π.χ στο σημείο (2.5,2.5)

Στην αρχή κάθε προγράμματος πολλές φορές είναι καλό να βάζουμε τις εντολές:

```
>>clear all;          (καθαρίζει τις μεταβλητές)

>>clc;                  (καθαρίζει την οθόνη)
```

6) Γραφική Διεπιφάνεια Χρήστη Graphical User Interface (GUI)

Η εφαρμογή GUI είναι ένας φιλικός τρόπος να κατασκευάζουμε Γραφικές Διεπιφάνειες Χρήστη. Εκκινεί με την παρακάτω εντολή:

>>guide

Περισσότερα στην Αναφορά 1.

Παράρτημα: Κώδικας

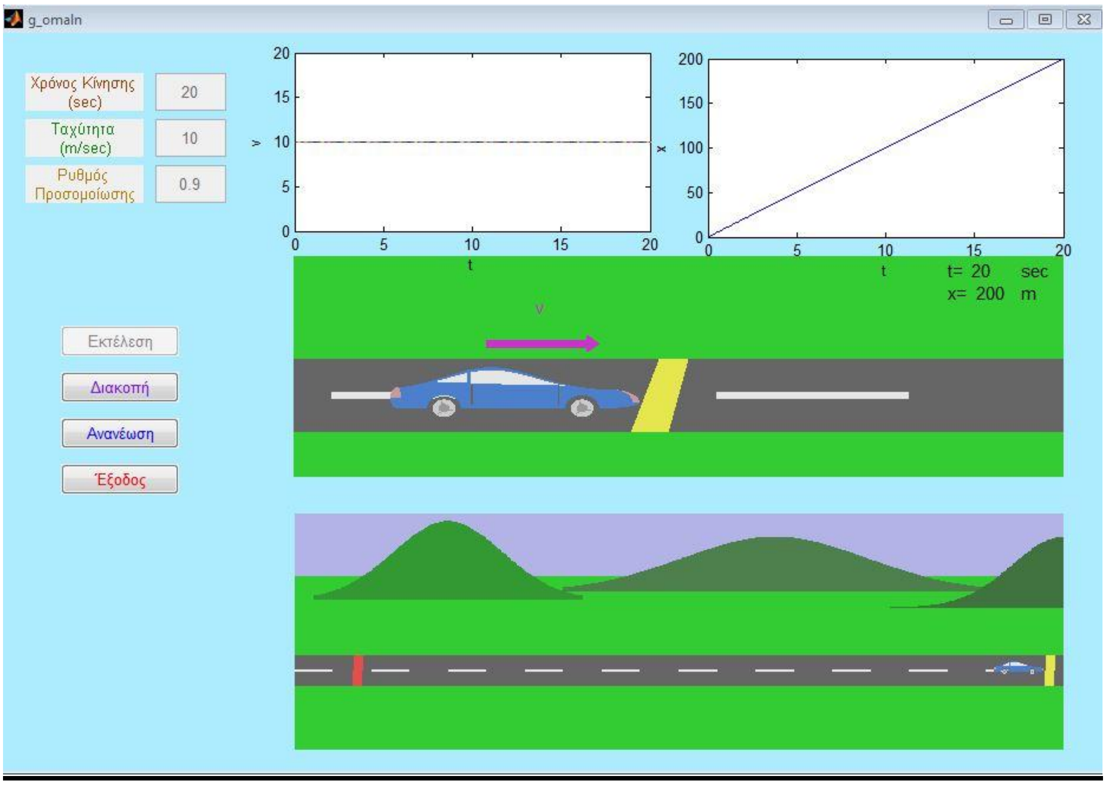
Ο κώδικας που αναπτύχθηκε για την εφαρμογή της Ευθύγραμμης Ομαλά Μεταβαλλόμενης Κίνησης είναι ο εξής:

```
function varargout = g_central(varargin)
% G_CENTRAL M-file for g_central.fig
%      G_CENTRAL, by itself, creates a new G_CENTRAL or raises 
the existing
%      singleton*.
%
%      H = G_CENTRAL returns the handle to a new G_CENTRAL or 
the handle to
%      the existing singleton*.
%
%      G_CENTRAL('CALLBACK',hObject,eventData,handles,...) 
calls the local
%      function named CALLBACK in G_CENTRAL.M with the given 
input arguments.
%
%      G_CENTRAL('Property','Value',...) creates a new 
G_CENTRAL or raises the
%      existing singleton*.  Starting from the left, property 
value pairs are
%      applied to the GUI before g_central_OpeningFcn gets 
called.  An
%      unrecognized property name or invalid value makes 
property application
%      stop.  All inputs are passed to g_central_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 g_central

% Last Modified by GUIDE v2.5 18-Feb-2014 04:50:20

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @g_central_OpeningFcn, 
...
                   'gui_OutputFcn',  @g_central_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 g_central is made visible.
function g_central_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 g_central (see
VARARGIN)

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%
x=imread('moderncar','jpg');

axes(handles.axes1)
axis off;

image(x);
axis off;

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


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

% Update handles structure
guidata(hObject, handles);

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


% --- Outputs from this function are returned to the command
line.
function varargout = g_central_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)

g_omaln;

% --- 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)

g_epitaxuvomevn;

% --- 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)

g_epiBraduvomevn;

% --- 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)

hfin=questdlg('Έξοδος από το πρόγραμμα;');
switch hfin
    case 'Yes'
        closereq;
end
```

Η απεικόνιση σε Matlab της εφαρμογής της Ευθύγραμμης Ομαλής Κίνησης:



g_omaln

Χρόνος Κίνησης (sec) 20

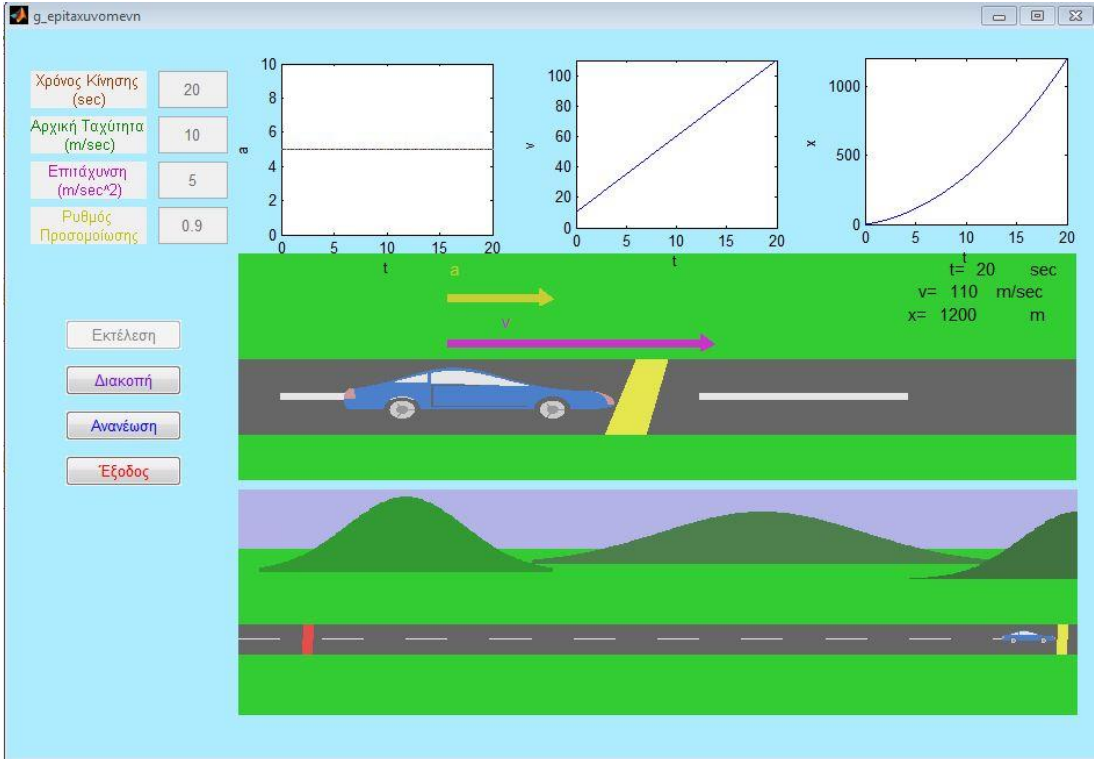
Ταχύτητα (m/sec) 10

Ρυθμός Προσομοίωσης 0.9

t= 20 sec

x= 200 m

Η απεικόνιση σε Matlab της εφαρμογής της Ευθύγραμμης Ομαλής ΕπιταχυνόμενηςΚίνησης:



g_epitaxuvomevn

Χρόνος Κίνησης (sec) 20

Αρχική Ταχύτητα (m/sec) 10

Επιτάχυνση (m/sec^2) 5

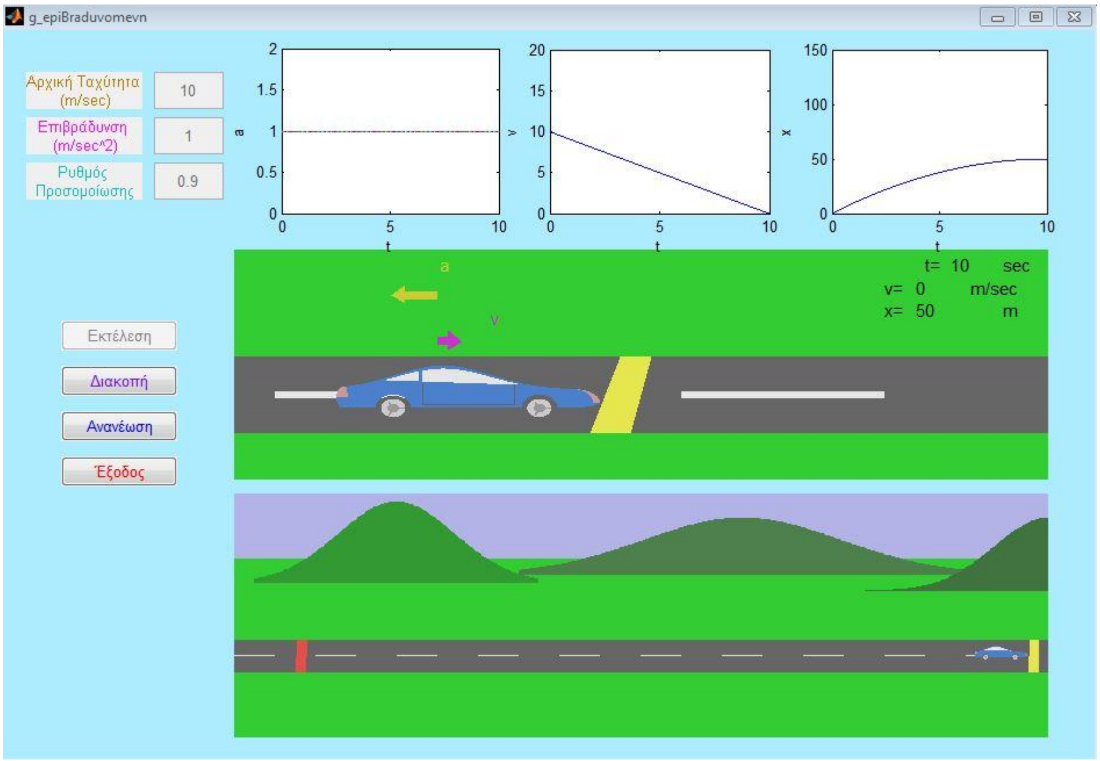
Ρυθμός Προσομοίωσης 0.9

t= 20 sec

v= 110 m/sec

x= 1200 m

Η απεικόνιση σε Matlab της εφαρμογής της Ευθύγραμμης Ομαλής Επιβραδυνόμενης Κίνησης:



g_epiBraduvomevn

Αρχική Ταχύτητα (m/sec) 10

Επιβράδυνση (m/sec^2) 1

Ρυθμός Προσομοίωσης 0.9

t= 10 sec

v= 0 m/sec

x= 50 m

```
function varargout = g_omaln(varargin)
% G_OMALN M-file for g_omaln.fig
%        G_OMALN, by itself, creates a new G_OMALN or raises the
existing
%      singleton*.
%
%      H = G_OMALN returns the handle to a new G_OMALN or the handle
to
%      the existing singleton*.
%
%        G_OMALN('CALLBACK',hObject,eventData,handles,...) calls the
local
%        function named CALLBACK in G_OMALN.M with the given input
arguments.
%
%         G_OMALN('Property','Value',...) creates a new G_OMALN or
raises the
%       existing singleton*.  Starting from the left, property value
pairs are
%      applied to the GUI before g_omaln_OpeningFcn gets called.  An
%        unrecognized property name or invalid value makes property
application
%          stop.  All inputs are passed to g_omaln_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 g_omaln

% Last Modified by GUIDE v2.5 04-Feb-2014 01:45:05

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @g_omaln_OpeningFcn, ...
                   'gui_OutputFcn',  @g_omaln_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 g_omaln is made visible.
function g_omaln_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 g_omaln (see VARARGIN)

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

% Update handles structure
guidata(hObject, handles);

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


% --- Outputs from this function are returned to the command line.
function varargout = g_omaln_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



function edit2_Callback(hObject, eventdata, handles)
% hObject    handle to edit2 (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 edit2 as text
%         str2double(get(hObject,'String')) returns contents of edit2
as a double


% --- Executes during object creation, after setting all properties.
function edit2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit2 (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



function edit3_Callback(hObject, eventdata, handles)
% hObject    handle to edit3 (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 edit3 as text
%         str2double(get(hObject,'String')) returns contents of edit3
as a double


% --- Executes during object creation, after setting all properties.
function edit3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit3 (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;
global tmax;
global v;

tmax=str2double(get(handles.edit1,'String'));
```

```
v=str2double(get(handles.edit2,'String'));
ryt=str2double(get(handles.edit3,'String'));

global stam;

stam=0;
set(handles.pushbutton2,'string','Διακοπή');

global status;
status=0;

global status1;
status1=0;

rryt=1.005-ryt;

if (ryt>1|ryt<0.001)
    h=warndlg('Βάλτε στο ρυθμό προσομοίωσης τιμή μεταξύ 0.001 και
1.0');
    return
end

if (tmax>20|tmax<10)
    h=warndlg('Βάλτε στο χρόνο κίνησης τιμή μεταξύ 10 και 20');
    return
end

if (v>10|v<5)
    h=warndlg('Βάλτε στη ταχύτητα τιμή μεταξύ 10 και 20');
    return
end

set(handles.edit1,'enable','off');
set(handles.edit2,'enable','off');
set(handles.edit3,'enable','off');

set(handles.pushbutton1,'enable','off');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
scale_x=0.35;
scale_y=0.7;

scale_cx=0.07;
scale_cy=0.17;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%5<=v<=10;
%10<=t<=20;
% v=10;
% tmax=20;
xmax=v*tmax;
%xmegisto=200
%xelaxisto=50
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% x=imread('moderncar','jpg');
% image(x);
```

```
xupoBa8ro=[0.0,4.0,4.0,0.0];
yupoBa8ro=[0.0,0.0,3.0,3.0];


x0=1.8;
y0=1.0;

th0=0:0.01:2*pi;

th1=0:0.01:pi/2;
xb1=-0.4+0.4*cos(th1);
yb1=0.0+0.25*sin(th1);

th1_1=pi/2:-0.01:0;
xb1_1=-0.4+0.3*cos(th1_1);
yb1_1=0.0+0.25*sin(th1_1);

xb2=-0.4:-0.01:-3.6;
yb2=(0.25-0.45*exp(-1.1*1.8^2))+0.45*exp(-1.1*(xb2+2.2).^2);
yb2_edge=(0.25-0.5*exp(-1.1*1.8^2))+0.5*exp(-1.1*(-3.6+2.2).^2);

th3=pi/2:0.01:pi;
xb3=-3.6+0.1*cos(th3);
yb3=yb2_edge-0.2+0.2*sin(th3);

th3_1=0:0.01:pi/2;
xb3_1=-3.58+0.04*cos(th3_1);
yb3_1=yb2_edge-0.2+0.2*sin(th3_1);

th4=pi:0.01:3*pi/2;
xb4=-3.6+0.1*cos(th4);
yb4=yb2_edge-0.2+0.2*sin(th4);

xb5=-2.9;
yb5=yb2_edge-0.4;

th6=pi:-0.01:0.0;
xb6=-2.9+0.25*cos(th6);
yb6=yb5+0.25*sin(th6);

xb7=-1.1;
yb7=yb5;

th8=pi:-0.01:0.0;
xb8=-0.85+0.25*cos(th8);
yb8=yb5+0.25*sin(th8);

th9=3*pi/2:0.01:2*pi;
xb9=-0.5+0.5*cos(th9);
yb9=0.0-yb5*sin(th9);

xb10=-1.1:-0.01:-3.0;
yb10=(0.24-0.40*exp(-1.1*1.8^2))+0.40*exp(-1.1*(xb10+2.2).^2);
yb10_edge=(0.24-0.40*exp(-1.1*1.8^2))+0.40*exp(-1.1*(-1.1+2.2).^2);

th11=0.0:0.01:2*pi;
xb11=-2.9+0.23*cos(th11);
yb11=yb5+0.23*sin(th11);
```

```
th12=0.0:0.01:2*pi;
xb12=-2.9+0.17*cos(th12);
yb12=yb5+0.17*sin(th12);

th13=0.0:0.01:2*pi;
xb13=-0.85+0.23*cos(th13);
yb13=yb5+0.23*sin(th13);

th14=0.0:0.01:2*pi;
xb14=-0.85+0.17*cos(th14);
yb14=yb5+0.17*sin(th14);

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% ryt=0.9;
% rryt=1.005-ryt;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xcfield1=[0.0,4.0,4.0,0.0];
ycfield1=[0.0,0.0,0.8,0.8];

xcroad=[0.0,4.0,4.0,0.0];
ycroad=[0.8,0.8,1.2,1.2];

xcfield2=[0.0,4.0,4.0,0.0];
ycfield2=[1.2,1.2,2.2,2.2];

xcsky=[0.0,4.0,4.0,0.0];
ycsky=[2.2,2.2,3.0,3.0];

xB1=0.1:0.01:1.5;
xcBouvo1=[0.1,xB1,1.5];
ycBouvo1=[1.9,1.9+1.0*exp(-6.1*(xB1-0.8).^2),1.9];

xB2=1.4:0.01:3.6;
xcBouvo2=[1.4,xB2,3.6];
ycBouvo2=[2.0,2.0+0.7*exp(-2.1*(xB2-2.5).^2),2.0];

xB3=3.1:0.01:4.0;
xcBouvo3=[3.1,xB3,4.0];
ycBouvo3=[1.8,1.8+0.9*exp(-7.1*(xB3-4.0).^2),1.8];

xcline1=[0.0,0.2,0.2,0.0];
ycline1=[0.99,0.99,1.01,1.01];

xcline2=[0.0,0.2,0.2,0.0]+0.4;
ycline2=[0.99,0.99,1.01,1.01];

xcline3=[0.0,0.2,0.2,0.0]+2*0.4;
ycline3=[0.99,0.99,1.01,1.01];

xcline4=[0.0,0.2,0.2,0.0]+3*0.4;
ycline4=[0.99,0.99,1.01,1.01];

xcline5=[0.0,0.2,0.2,0.0]+4*0.4;
ycline5=[0.99,0.99,1.01,1.01];
```

```
xcline6=[0.0,0.2,0.2,0.0]+5*0.4;
ycline6=[0.99,0.99,1.01,1.01];

xcline7=[0.0,0.2,0.2,0.0]+6*0.4;
ycline7=[0.99,0.99,1.01,1.01];

xcline8=[0.0,0.2,0.2,0.0]+7*0.4;
ycline8=[0.99,0.99,1.01,1.01];

xcline9=[0.0,0.2,0.2,0.0]+8*0.4;
ycline9=[0.99,0.99,1.01,1.01];

xcline10=[0.0,0.2,0.2,0.0]+9*0.4;
ycline10=[0.99,0.99,1.01,1.01];

xcline_begin=[0.3,0.35,0.36,0.31];
ycline_begin=[0.8,0.8,1.2,1.2];

xcline_end=[0.3,0.35,0.36,0.31]+3.6*(xmax/200);
ycline_end=[0.8,0.8,1.2,1.2];



xfield1=[0.0,4.0,4.0,0.0];
yfield1=[0.0,0.0,0.6,0.6];

xroad=[0.0,4.0,4.0,0.0];
yroad=[0.6,0.6,1.6,1.6];

xfield2=[0.0,4.0,4.0,0.0];
yfield2=[1.6,1.6,3.0,3.0];

x0v=1.0;
y0v=1.8;
lv=v*1.5/10;

xvectorv=x0v+scale_x*[0.0,0.0,lv,lv,lv+0.2,lv,lv];
yvectorv=y0v+scale_y*[0.075,-0.075,-0.075,-0.15,0.0,0.20,0.075];

xgv=x0v+scale_x*lv/2;
ygv=y0v+0.5;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%%%%xmin=0.3
%%%%xmax=3.9
iimax=(11*(tmax/20)-1);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
for ii=1:0.1:11*(tmax/20)

            if (status1==1)
                return
            end

            if (status==1)
                closereq;
                return
            end
```

```
         if (stam==1)
            cc1=stam;
            while (cc1==1)
                cc1=stam;
                pause(0.01);
                if (status1==1)
                    return
                end
                if (status==1)
                    return
                end
            end
          end


tt=(ii-1)*tmax/(11*(tmax/20)-1);
xx=v*tt;

ntt=num2str(0.01*round(100*tt));
nxx=num2str(0.01*round(100*xx));

tgr=tt+(tmax/133)*cos(th0);
xgr=xx+(xmax/54)*sin(th0);
vgr=v+(v/29)*sin(th0);

cx0=0.3+(xx/xmax)*(3.6*xmax/200);
cy0=1.0;


th15=0.0:0.01:2*pi;
xb15=-2.9+0.08*cos(th15);
yb15=yb5+0.08*sin(th15);

phi=0.0-3.6*(xx/200)/0.17;

xb15_1=-2.9+[0.08*cos(phi-pi/12),0.17*cos(phi),0.08*cos(phi+pi/12)];
yb15_1=yb5+[0.08*sin(phi-pi/12),0.17*sin(phi),0.08*sin(phi+pi/12)];

xb15_2=-2.9+[0.08*cos(phi-
pi/12+2*pi/3),0.17*cos(phi+2*pi/3),0.08*cos(phi+pi/12+2*pi/3)];
yb15_2=yb5+[0.08*sin(phi-
pi/12+2*pi/3),0.17*sin(phi+2*pi/3),0.08*sin(phi+pi/12+2*pi/3)];

xb15_3=-2.9+[0.08*cos(phi-
pi/12+4*pi/3),0.17*cos(phi+4*pi/3),0.08*cos(phi+pi/12+4*pi/3)];
yb15_3=yb5+[0.08*sin(phi-
pi/12+4*pi/3),0.17*sin(phi+4*pi/3),0.08*sin(phi+pi/12+4*pi/3)];

th16=0.0:0.01:2*pi;
xb16=-0.85+0.08*cos(th16);
yb16=yb5+0.08*sin(th16);

xb16_1=-0.85+[0.08*cos(phi-pi/12),0.17*cos(phi),0.08*cos(phi+pi/12)];
yb16_1=yb5+[0.08*sin(phi-pi/12),0.17*sin(phi),0.08*sin(phi+pi/12)];

xb16_2=-0.85+[0.08*cos(phi-
pi/12+2*pi/3),0.17*cos(phi+2*pi/3),0.08*cos(phi+pi/12+2*pi/3)];
```

```
yb16_2=yb5+[0.08*sin(phi-
pi/12+2*pi/3),0.17*sin(phi+2*pi/3),0.08*sin(phi+pi/12+2*pi/3)];

xb16_3=-0.85+[0.08*cos(phi-
pi/12+4*pi/3),0.17*cos(phi+4*pi/3),0.08*cos(phi+pi/12+4*pi/3)];
yb16_3=yb5+[0.08*sin(phi-
pi/12+4*pi/3),0.17*sin(phi+4*pi/3),0.08*sin(phi+pi/12+4*pi/3)];

xb17=[xb3,xb3_1];
yb17=[yb3,yb3_1];

xb18=[xb1,xb1_1];
yb18=[yb1,yb1_1];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%


xcar1=x0+scale_x*[xb1,xb2,xb3,xb4,xb5,xb6,xb7,xb8,xb9];
ycar1=y0+scale_y*[yb1,yb2,yb3,yb4,yb5,yb6,yb7,yb8,yb9];

xcar2=x0+scale_x*[xb10];
ycar2=y0+scale_y*[yb10];

xcar3=x0+scale_x*[-2.5,-2.55,-2.55,-2.5];
ycar3=y0+scale_y*(yb10_edge+[0.0,0.0,0.3,0.3]);

xcar4=x0+scale_x*[-2.5,-2.5,-1.20,-1.19];
ycar4=y0+scale_y*(yb10_edge+[0.04,-0.38,-0.38,0.007]);

xcar5=x0+scale_x*[-2.475,-2.475,-1.21,-1.20];
ycar5=y0+scale_y*(yb10_edge+[0.035,-0.37,-0.37,0.002]);

xcar6=x0+scale_x*[xb11];
ycar6=y0+scale_y*[yb11];

xcar7=x0+scale_x*[xb12];
ycar7=y0+scale_y*[yb12];

xcar8=x0+scale_x*[xb13];
ycar8=y0+scale_y*[yb13];

xcar9=x0+scale_x*[xb14];
ycar9=y0+scale_y*[yb14];

xcar10=x0+scale_x*[xb15];
ycar10=y0+scale_y*[yb15];

xcar10_1=x0+scale_x*xb15_1;
ycar10_1=y0+scale_y*yb15_1;

xcar10_2=x0+scale_x*xb15_2;
ycar10_2=y0+scale_y*yb15_2;

xcar10_3=x0+scale_x*xb15_3;
ycar10_3=y0+scale_y*yb15_3;
```

```
xcar11=x0+scale_x*[xb16];
ycar11=y0+scale_y*[yb16];

xcar11_1=x0+scale_x*xb16_1;
ycar11_1=y0+scale_y*yb16_1;

xcar11_2=x0+scale_x*xb16_2;
ycar11_2=y0+scale_y*yb16_2;

xcar11_3=x0+scale_x*xb16_3;
ycar11_3=y0+scale_y*yb16_3;

xcar12=x0+scale_x*xb17;
ycar12=y0+scale_y*yb17;

xcar13=x0+scale_x*xb18;
ycar13=y0+scale_y*yb18;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xccar1=cx0+scale_cx*[xb1,xb2,xb3,xb4,xb5,xb6,xb7,xb8,xb9];
yccar1=cy0+scale_cy*[yb1,yb2,yb3,yb4,yb5,yb6,yb7,yb8,yb9];

xccar2=cx0+scale_cx*[xb10];
yccar2=cy0+scale_cy*[yb10];

xccar3=cx0+scale_cx*[-2.5,-2.55,-2.55,-2.5];
yccar3=cy0+scale_cy*(yb10_edge+[0.0,0.0,0.3,0.3]);

xccar4=cx0+scale_cx*[-2.5,-2.5,-1.20,-1.19];
yccar4=cy0+scale_cy*(yb10_edge+[0.04,-0.38,-0.38,0.007]);

xccar5=cx0+scale_cx*[-2.49,-2.49,-1.21,-1.20];
yccar5=cy0+scale_cy*(yb10_edge+[0.035,-0.37,-0.37,0.002]);

xccar6=cx0+scale_cx*[xb11];
yccar6=cy0+scale_cy*[yb11];

xccar7=cx0+scale_cx*[xb12];
yccar7=cy0+scale_cy*[yb12];

xccar8=cx0+scale_cx*[xb13];
yccar8=cy0+scale_cy*[yb13];

xccar9=cx0+scale_cx*[xb14];
yccar9=cy0+scale_cy*[yb14];

xccar10=cx0+scale_cx*[xb15];
yccar10=cy0+scale_cy*[yb15];

xccar10_1=cx0+scale_cx*xb15_1;
yccar10_1=cy0+scale_cy*yb15_1;

xccar10_2=cx0+scale_cx*xb15_2;
yccar10_2=cy0+scale_cy*yb15_2;

xccar10_3=cx0+scale_cx*xb15_3;
yccar10_3=cy0+scale_cy*yb15_3;
```

```
xccar11=cx0+scale_cx*[xb16];
yccar11=cy0+scale_cy*[yb16];

xccar11_1=x0+scale_cx*xb16_1;
yccar11_1=y0+scale_cy*yb16_1;

xccar11_2=cx0+scale_cx*xb16_2;
yccar11_2=cy0+scale_cy*yb16_2;

xccar11_3=cx0+scale_cx*xb16_3;
yccar11_3=cy0+scale_cy*yb16_3;

xccar12=cx0+scale_cx*xb17;
yccar12=cy0+scale_cy*yb17;

xccar13=cx0+scale_cx*xb18;
yccar13=cy0+scale_cy*yb18;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xline0=[2.2,2.2+1.0,2.2+1.0,2.2]-1*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline0=[1.05,1.05,1.15,1.15];

xline1=[2.2,2.2+1.0,2.2+1.0,2.2]-(ii-1)*18.0*(xmax/200)/iimax;
yline1=[1.05,1.05,1.15,1.15];

xline2=[2.2,2.2+1.0,2.2+1.0,2.2]+1*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline2=[1.05,1.05,1.15,1.15];

xline3=[2.2,2.2+1.0,2.2+1.0,2.2]+2*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline3=[1.05,1.05,1.15,1.15];

xline4=[2.2,2.2+1.0,2.2+1.0,2.2]+3*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline4=[1.05,1.05,1.15,1.15];

xline5=[2.2,2.2+1.0,2.2+1.0,2.2]+4*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline5=[1.05,1.05,1.15,1.15];

xline6=[2.2,2.2+1.0,2.2+1.0,2.2]+5*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline6=[1.05,1.05,1.15,1.15];

xline7=[2.2,2.2+1.0,2.2+1.0,2.2]+6*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline7=[1.05,1.05,1.15,1.15];

xline8=[2.2,2.2+1.0,2.2+1.0,2.2]+7*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline8=[1.05,1.05,1.15,1.15];

xline9=[2.2,2.2+1.0,2.2+1.0,2.2]+8*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline9=[1.05,1.05,1.15,1.15];

xline10=[2.2,2.2+1.0,2.2+1.0,2.2]+9*2.0-(ii-1)*18.0*(xmax/200)/iimax;
yline10=[1.05,1.05,1.15,1.15];

xline11=[2.2,2.2+1.0,2.2+1.0,2.2]+10*2.0-(ii-
1)*18.0*(xmax/200)/iimax;
yline11=[1.05,1.05,1.15,1.15];
```

```
xline_begin=[1.75,1.95,2.05,1.90]-(ii-1)*18.0*(xmax/200)/iimax;
yline_begin=[0.6,0.6,1.6,1.6];

xline_end=[1.75,1.95,2.05,1.90]+9*2.0*(xmax/200)-(ii-
1)*18.0*(xmax/200)/iimax;
yline_end=[0.6,0.6,1.6,1.6];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%


%subplot(2,1,1)
axes(handles.axes3)
axis off;



fill(xupoBa8ro,yupoBa8ro,[1.0,1.0,1.0],...
     xfield1,yfield1,[0.2,0.8,0.2],...
     xroad,yroad,[0.4,0.4,0.4],...
     xfield2,yfield2,[0.2,0.8,0.2],...
     xline0,yline0,[0.9,0.9,0.9],...
     xline1,yline1,[0.9,0.9,0.9],...
     xline2,yline2,[0.9,0.9,0.9],...
     xline3,yline3,[0.9,0.9,0.9],...
     xline4,yline4,[0.9,0.9,0.9],...
     xline5,yline5,[0.9,0.9,0.9],...
     xline6,yline6,[0.9,0.9,0.9],...
     xline7,yline7,[0.9,0.9,0.9],...
     xline8,yline8,[0.9,0.9,0.9],...
     xline9,yline9,[0.9,0.9,0.9],...
     xline10,yline10,[0.9,0.9,0.9],...
     xline11,yline11,[0.9,0.9,0.9],...
     xline_begin,yline_begin,[0.9,0.3,0.3],...
     xline_end,yline_end,[0.9,0.9,0.3],...
     xcar1,ycar1,[0.3,0.5,0.8],...
     xcar2,ycar2,[0.9,0.9,0.9],...
     xcar3,ycar3,[0.3,0.5,0.8],...
     xcar4,ycar4,[0.4,0.4,0.4],...
     xcar5,ycar5,[0.3,0.5,0.8],...
     xcar6,ycar6,[0.4,0.4,0.4],...
     xcar7,ycar7,[0.8,0.8,0.8],...
     xcar8,ycar8,[0.4,0.4,0.4],...
     xcar9,ycar9,[0.8,0.8,0.8],...
     xcar10,ycar10,[0.6,0.6,0.6],...
     xcar10_1,ycar10_1,[0.6,0.6,0.6],...
     xcar10_2,ycar10_2,[0.6,0.6,0.6],...
     xcar10_3,ycar10_3,[0.6,0.6,0.6],...
     xcar11,ycar11,[0.6,0.6,0.6],...
     xcar11_1,ycar11_1,[0.6,0.6,0.6],...
     xcar11_2,ycar11_2,[0.6,0.6,0.6],...
     xcar11_3,ycar11_3,[0.6,0.6,0.6],...
     xcar12,ycar12,[0.8,0.6,0.6],...
     xcar13,ycar13,[0.8,0.6,0.6],...
     xvectorv,yvectorv,[0.8,0.2,0.8],...
     'Linestyle','None')

text(xgv,ygv,'v','Color',[0.8,0.2,0.8],'Fontsize',11)
text(3.4,2.8,'t=','Fontsize',11)
text(3.525,2.8,ntt,'Fontsize',11)
text(3.78,2.8,'sec','Fontsize',11)

text(3.4,2.5,'x=','Fontsize',11)
text(3.55,2.5,nxx,'Fontsize',11)
text(3.78,2.5,'m','Fontsize',11)

axis([0.0,4.0,0.0,3.0])
axis off


%subplot(2,1,2)
axes(handles.axes4)
axis off;


fill(xupoBa8ro,yupoBa8ro,[1.0,1.0,1.0],...
     xcfield1,ycfield1,[0.2,0.8,0.2],...
     xcroad,ycroad,[0.4,0.4,0.4],...
     xcfield2,ycfield2,[0.2,0.8,0.2],...
     xcsky,ycsky,[0.7,0.7,0.9],...
     xcBouvo1,ycBouvo1,[0.2,0.6,0.2],...
     xcBouvo2,ycBouvo2,[0.3,0.5,0.3],...
     xcBouvo3,ycBouvo3,[0.25,0.45,0.25],...
     xcline1,ycline1,[0.9,0.9,0.9],...
     xcline2,ycline2,[0.9,0.9,0.9],...
     xcline3,ycline3,[0.9,0.9,0.9],...
     xcline4,ycline4,[0.9,0.9,0.9],...
     xcline5,ycline5,[0.9,0.9,0.9],...
     xcline6,ycline6,[0.9,0.9,0.9],...
     xcline7,ycline7,[0.9,0.9,0.9],...
     xcline8,ycline8,[0.9,0.9,0.9],...
     xcline9,ycline9,[0.9,0.9,0.9],...
     xcline10,ycline10,[0.9,0.9,0.9],...
     xcline_begin,ycline_begin,[0.9,0.3,0.3],...
     xcline_end,ycline_end,[0.9,0.9,0.3],...
     xccar1,yccar1,[0.3,0.5,0.8],...
     xccar2,yccar2,[0.9,0.9,0.9],...
     xccar3,yccar3,[0.3,0.5,0.8],...
     xccar4,yccar4,[0.4,0.4,0.4],...
     xccar5,yccar5,[0.3,0.5,0.8],...
     xccar6,yccar6,[0.4,0.4,0.4],...
     xccar7,yccar7,[0.8,0.8,0.8],...
     xccar8,yccar8,[0.4,0.4,0.4],...
     xccar9,yccar9,[0.8,0.8,0.8],...
     xccar10,yccar10,[0.6,0.6,0.6],...
     xccar10_1,yccar10_1,[0.6,0.6,0.6],...
     xccar10_2,yccar10_2,[0.6,0.6,0.6],...
     xccar10_3,yccar10_3,[0.6,0.6,0.6],...
     xccar11,yccar11,[0.6,0.6,0.6],...
     xccar11_1,yccar11_1,[0.6,0.6,0.6],...
     xccar11_2,yccar11_2,[0.6,0.6,0.6],...
     xccar11_3,yccar11_3,[0.6,0.6,0.6],...
     xccar12,yccar12,[0.8,0.6,0.6],...
     xccar13,yccar13,[0.8,0.6,0.6],...
     'Linestyle','None')

axis([0.0,4.0,0.0,3.0])
axis off
```

```
axes(handles.axes1)
axis off;
fill(tgr,vgr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,2*v])
xlabel('t')
ylabel('v')


%subplot(1,2,2)
axes(handles.axes2)
axis off;
fill(tgr,xgr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,v*tmax])
xlabel('t')
ylabel('x')



if (ii==1)
    pause(5.0)
end


pause(rryt)

end

tgr=0:0.01:tmax;
vgr=v;
xgr=v*tgr;

%subplot(1,2,1)
axes(handles.axes1)
axis off;
plot(tgr,v)
axis([0,tmax,0,2*v])
xlabel('t')
ylabel('v')

%subplot(1,2,2)
axes(handles.axes2)
axis off;
plot(tgr,xgr)
axis([0,tmax,0,v*tmax])
xlabel('t')
ylabel('x')

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

% --- 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 stam;

if (stam==0)
    set(handles.pushbutton2,'string','Συνέχεια')
    stam=1;
elseif (stam==1)
   set(handles.pushbutton2,'string','Διακοπή')
   stam=0;
else
end
guidata(hObject, handles);

% --- 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 ryt;
global tmax;
global v;

axes(handles.axes1)
axis off;
cla
axes(handles.axes2)
axis off;
cla
axes(handles.axes3)
axis off;
cla
axes(handles.axes4)
axis off;
cla

global status1;
status1=1;

clear ryt;
clear tmax;
clear v;

set(handles.edit1,'enable','on','string','20');
set(handles.edit2,'enable','on','string','10');
set(handles.edit3,'enable','on','string','0.9');


set(handles.pushbutton1,'enable','on');
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 status;
```

```
hfin=questdlg('Έξοδος από το πρόγραμμα;');
switch hfin
    case 'Yes'
        status=1;
        closereq;
end
```

```
 function varargout = g_epitaxuvomevn(varargin)
% G_EPITAXUVOMEVN M-file for g_epitaxuvomevn.fig
%      G_EPITAXUVOMEVN, by itself, creates a new G_EPITAXUVOMEVN or
raises the existing
%      singleton*.
%
%      H = G_EPITAXUVOMEVN returns the handle to a new
G_EPITAXUVOMEVN or the handle to
%      the existing singleton*.
%
%      G_EPITAXUVOMEVN('CALLBACK',hObject,eventData,handles,...)
calls the local
%      function named CALLBACK in G_EPITAXUVOMEVN.M with the given
input arguments.
%
%      G_EPITAXUVOMEVN('Property','Value',...) creates a new
G_EPITAXUVOMEVN or raises the
%      existing singleton*.  Starting from the left, property value
pairs are
%      applied to the GUI before g_epitaxuvomevn_OpeningFcn gets
called.  An
%      unrecognized property name or invalid value makes property
application
%      stop.  All inputs are passed to g_epitaxuvomevn_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 g_epitaxuvomevn

% Last Modified by GUIDE v2.5 13-Feb-2014 08:52:04

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @g_epitaxuvomevn_OpeningFcn, ...
                   'gui_OutputFcn',  @g_epitaxuvomevn_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 g_epitaxuvomevn is made visible.
function g_epitaxuvomevn_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 g_epitaxuvomevn (see VARARGIN)

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

% Update handles structure
guidata(hObject, handles);

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


% --- Outputs from this function are returned to the command line.
function varargout = g_epitaxuvomevn_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



function edit2_Callback(hObject, eventdata, handles)
% hObject    handle to edit2 (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 edit2 as text
%        str2double(get(hObject,'String')) returns contents of edit2
as a double


% --- Executes during object creation, after setting all properties.
function edit2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit2 (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



function edit3_Callback(hObject, eventdata, handles)
% hObject    handle to edit3 (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 edit3 as text
%        str2double(get(hObject,'String')) returns contents of edit3
as a double


% --- Executes during object creation, after setting all properties.
function edit3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit3 (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



function edit4_Callback(hObject, eventdata, handles)
```

```
% hObject    handle to edit4 (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 edit4 as text
%        str2double(get(hObject,'String')) returns contents of edit4
as a double


% --- Executes during object creation, after setting all properties.
function edit4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit4 (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;
global tmax;
global v;
global a;

tmax=str2double(get(handles.edit1,'String'));
v=str2double(get(handles.edit2,'String'));
a=str2double(get(handles.edit3,'String'));
ryt=str2double(get(handles.edit4,'String'));

global stam;

stam=0;
set(handles.pushbutton2,'string','Διακοπή');

global status;
status=0;

global status1;
status1=0;

rryt=1.005-ryt;

if (ryt>1|ryt<0.001)
    h=warndlg('Βάλτε στο ρυθμό προσομοίωσης τιμή μεταξύ 0.001 και
1.0');
```

```
    return
end

if (tmax>20|tmax<10)
    h=warndlg('Βάλτε στο χρόνο κίνησης τιμή μεταξύ 10 και 20');
    return
end

if (v>10|v<5)
    h=warndlg('Βάλτε στη ταχύτητα τιμή μεταξύ 10 και 20');
    return
end

if (a>5|a<1)
    h=warndlg('Βάλτε στη επιτάχυνση τιμή μεταξύ 1 και 5');
    return
end

set(handles.edit1,'enable','off');
set(handles.edit2,'enable','off');
set(handles.edit3,'enable','off');
set(handles.edit4,'enable','off');


set(handles.pushbutton1,'enable','off');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
scale_x=0.35;
scale_y=0.7;

scale_cx=0.07;
scale_cy=0.17;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%5<=v<=10;
%10<=t<=20;
%1<=a<=5;
% v=10;
% tmax=20;
% a=5;
vmax=v+a*tmax;
xmax=v*tmax+0.5*a*tmax*tmax;
%xmegisto=1200
%xelaxisto=100
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% x=imread('moderncar','jpg');
% image(x);
xupoBa8ro=[0.0,4.0,4.0,0.0];
yupoBa8ro=[0.0,0.0,3.0,3.0];


x0=1.8;
y0=1.0;

th0=0:0.01:2*pi;
```

```
th1=0:0.01:pi/2;
xb1=-0.4+0.4*cos(th1);
yb1=0.0+0.25*sin(th1);

th1_1=pi/2:-0.01:0;
xb1_1=-0.4+0.3*cos(th1_1);
yb1_1=0.0+0.25*sin(th1_1);

xb2=-0.4:-0.01:-3.6;
yb2=(0.25-0.45*exp(-1.1*1.8^2))+0.45*exp(-1.1*(xb2+2.2).^2);
yb2_edge=(0.25-0.5*exp(-1.1*1.8^2))+0.5*exp(-1.1*(-3.6+2.2).^2);

th3=pi/2:0.01:pi;
xb3=-3.6+0.1*cos(th3);
yb3=yb2_edge-0.2+0.2*sin(th3);

th3_1=0:0.01:pi/2;
xb3_1=-3.58+0.04*cos(th3_1);
yb3_1=yb2_edge-0.2+0.2*sin(th3_1);

th4=pi:0.01:3*pi/2;
xb4=-3.6+0.1*cos(th4);
yb4=yb2_edge-0.2+0.2*sin(th4);

xb5=-2.9;
yb5=yb2_edge-0.4;

th6=pi:-0.01:0.0;
xb6=-2.9+0.25*cos(th6);
yb6=yb5+0.25*sin(th6);

xb7=-1.1;
yb7=yb5;

th8=pi:-0.01:0.0;
xb8=-0.85+0.25*cos(th8);
yb8=yb5+0.25*sin(th8);

th9=3*pi/2:0.01:2*pi;
xb9=-0.5+0.5*cos(th9);
yb9=0.0-yb5*sin(th9);

xb10=-1.1:-0.01:-3.0;
yb10=(0.24-0.40*exp(-1.1*1.8^2))+0.40*exp(-1.1*(xb10+2.2).^2);
yb10_edge=(0.24-0.40*exp(-1.1*1.8^2))+0.40*exp(-1.1*(-1.1+2.2).^2);

th11=0.0:0.01:2*pi;
xb11=-2.9+0.23*cos(th11);
yb11=yb5+0.23*sin(th11);

th12=0.0:0.01:2*pi;
xb12=-2.9+0.17*cos(th12);
yb12=yb5+0.17*sin(th12);

th13=0.0:0.01:2*pi;
xb13=-0.85+0.23*cos(th13);
yb13=yb5+0.23*sin(th13);
```

```
th14=0.0:0.01:2*pi;
xb14=-0.85+0.17*cos(th14);
yb14=yb5+0.17*sin(th14);

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
ryt=0.9;
rryt=1.005-ryt;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xcfield1=[0.0,4.0,4.0,0.0];
ycfield1=[0.0,0.0,0.8,0.8];

xcroad=[0.0,4.0,4.0,0.0];
ycroad=[0.8,0.8,1.2,1.2];

xcfield2=[0.0,4.0,4.0,0.0];
ycfield2=[1.2,1.2,2.2,2.2];

xcsky=[0.0,4.0,4.0,0.0];
ycsky=[2.2,2.2,3.0,3.0];

xB1=0.1:0.01:1.5;
xcBouvo1=[0.1,xB1,1.5];
ycBouvo1=[1.9,1.9+1.0*exp(-6.1*(xB1-0.8).^2),1.9];

xB2=1.4:0.01:3.6;
xcBouvo2=[1.4,xB2,3.6];
ycBouvo2=[2.0,2.0+0.7*exp(-2.1*(xB2-2.5).^2),2.0];

xB3=3.1:0.01:4.0;
xcBouvo3=[3.1,xB3,4.0];
ycBouvo3=[1.8,1.8+0.9*exp(-7.1*(xB3-4.0).^2),1.8];

xcline1=[0.0,0.2,0.2,0.0];
ycline1=[0.99,0.99,1.01,1.01];

xcline2=[0.0,0.2,0.2,0.0]+0.4;
ycline2=[0.99,0.99,1.01,1.01];

xcline3=[0.0,0.2,0.2,0.0]+2*0.4;
ycline3=[0.99,0.99,1.01,1.01];

xcline4=[0.0,0.2,0.2,0.0]+3*0.4;
ycline4=[0.99,0.99,1.01,1.01];

xcline5=[0.0,0.2,0.2,0.0]+4*0.4;
ycline5=[0.99,0.99,1.01,1.01];

xcline6=[0.0,0.2,0.2,0.0]+5*0.4;
ycline6=[0.99,0.99,1.01,1.01];

xcline7=[0.0,0.2,0.2,0.0]+6*0.4;
ycline7=[0.99,0.99,1.01,1.01];

xcline8=[0.0,0.2,0.2,0.0]+7*0.4;
ycline8=[0.99,0.99,1.01,1.01];
```

```
xcline9=[0.0,0.2,0.2,0.0]+8*0.4;
ycline9=[0.99,0.99,1.01,1.01];

xcline10=[0.0,0.2,0.2,0.0]+9*0.4;
ycline10=[0.99,0.99,1.01,1.01];

xcline_begin=[0.3,0.35,0.36,0.31];
ycline_begin=[0.8,0.8,1.2,1.2];

xcline_end=[0.3,0.35,0.36,0.31]+3.6*(xmax/1200);
ycline_end=[0.8,0.8,1.2,1.2];



xfield1=[0.0,4.0,4.0,0.0];
yfield1=[0.0,0.0,0.6,0.6];

xroad=[0.0,4.0,4.0,0.0];
yroad=[0.6,0.6,1.6,1.6];

xfield2=[0.0,4.0,4.0,0.0];
yfield2=[1.6,1.6,3.0,3.0];

x0v=1.0;
y0v=1.8;
la=a*2.5/10;
lv=v*1.5/10;

xvectora=x0v+scale_x*[0.0,0.0,la,la,la+0.2,la,la];
yvectora=y0v+scale_y*[0.075,-0.075,-0.075,-0.15,0.0,0.20,0.075]+0.6;

xgv=x0v+scale_x*lv/2;
ygv=y0v+0.5;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%%%%xmin=0.3
%%%%xmax=3.9
iimax=(11*(tmax/20)-1);
jjmax=v*tmax+0.5*a*tmax*tmax;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
for ii=1:0.1:11*(tmax/20)

            if (status1==1)
                return
            end

            if (status==1)
                closereq;
                return
            end

         if (stam==1)
            cc1=stam;
            while (cc1==1)
                cc1=stam;
                pause(0.01);
                if (status1==1)
```

```
                    return
                end
                if (status==1)
                    return
                end
            end
          end


tt=(ii-1)*tmax/(11*(tmax/20)-1);
xx=v*tt+0.5*a*tt*tt;
UU=v+a*tt;

lU=(v+0.13*a*tt)*1.5/10;

xvectorv=x0v+scale_x*[0.0,0.0,lU,lU,lU+0.2,lU,lU];
yvectorv=y0v+scale_y*[0.075,-0.075,-0.075,-0.15,0.0,0.20,0.075];

agr=a+(a/39)*sin(th0);
tgr=tt+(tmax/63)*cos(th0);
xgr=xx+(xmax/54)*sin(th0);
vgr=UU+(vmax/49)*sin(th0);

ntt=num2str(0.01*round(100*tt));
nxx=num2str(0.01*round(100*xx));
nUU=num2str(0.01*round(100*UU));

cx0=0.3+(xx/xmax)*(3.6*xmax/1200);
cy0=1.0;


th15=0.0:0.01:2*pi;
xb15=-2.9+0.08*cos(th15);
yb15=yb5+0.08*sin(th15);

phi=0.0-(ii-1)*14*pi/iimax;

xb15_1=-2.9+[0.08*cos(phi-pi/12),0.17*cos(phi),0.08*cos(phi+pi/12)];
yb15_1=yb5+[0.08*sin(phi-pi/12),0.17*sin(phi),0.08*sin(phi+pi/12)];

xb15_2=-2.9+[0.08*cos(phi-
pi/12+2*pi/3),0.17*cos(phi+2*pi/3),0.08*cos(phi+pi/12+2*pi/3)];
yb15_2=yb5+[0.08*sin(phi-
pi/12+2*pi/3),0.17*sin(phi+2*pi/3),0.08*sin(phi+pi/12+2*pi/3)];

xb15_3=-2.9+[0.08*cos(phi-
pi/12+4*pi/3),0.17*cos(phi+4*pi/3),0.08*cos(phi+pi/12+4*pi/3)];
yb15_3=yb5+[0.08*sin(phi-
pi/12+4*pi/3),0.17*sin(phi+4*pi/3),0.08*sin(phi+pi/12+4*pi/3)];

th16=0.0:0.01:2*pi;
xb16=-0.85+0.08*cos(th16);
yb16=yb5+0.08*sin(th16);

xb16_1=-0.85+[0.08*cos(phi-pi/12),0.17*cos(phi),0.08*cos(phi+pi/12)];
yb16_1=yb5+[0.08*sin(phi-pi/12),0.17*sin(phi),0.08*sin(phi+pi/12)];
```

```
xb16_2=-0.85+[0.08*cos(phi-
pi/12+2*pi/3),0.17*cos(phi+2*pi/3),0.08*cos(phi+pi/12+2*pi/3)];
yb16_2=yb5+[0.08*sin(phi-
pi/12+2*pi/3),0.17*sin(phi+2*pi/3),0.08*sin(phi+pi/12+2*pi/3)];

xb16_3=-0.85+[0.08*cos(phi-
pi/12+4*pi/3),0.17*cos(phi+4*pi/3),0.08*cos(phi+pi/12+4*pi/3)];
yb16_3=yb5+[0.08*sin(phi-
pi/12+4*pi/3),0.17*sin(phi+4*pi/3),0.08*sin(phi+pi/12+4*pi/3)];

xb17=[xb3,xb3_1];
yb17=[yb3,yb3_1];

xb18=[xb1,xb1_1];
yb18=[yb1,yb1_1];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%


xcar1=x0+scale_x*[xb1,xb2,xb3,xb4,xb5,xb6,xb7,xb8,xb9];
ycar1=y0+scale_y*[yb1,yb2,yb3,yb4,yb5,yb6,yb7,yb8,yb9];

xcar2=x0+scale_x*[xb10];
ycar2=y0+scale_y*[yb10];

xcar3=x0+scale_x*[-2.5,-2.55,-2.55,-2.5];
ycar3=y0+scale_y*(yb10_edge+[0.0,0.0,0.3,0.3]);

xcar4=x0+scale_x*[-2.5,-2.5,-1.20,-1.19];
ycar4=y0+scale_y*(yb10_edge+[0.04,-0.38,-0.38,0.007]);

xcar5=x0+scale_x*[-2.475,-2.475,-1.21,-1.20];
ycar5=y0+scale_y*(yb10_edge+[0.035,-0.37,-0.37,0.002]);

xcar6=x0+scale_x*[xb11];
ycar6=y0+scale_y*[yb11];

xcar7=x0+scale_x*[xb12];
ycar7=y0+scale_y*[yb12];

xcar8=x0+scale_x*[xb13];
ycar8=y0+scale_y*[yb13];

xcar9=x0+scale_x*[xb14];
ycar9=y0+scale_y*[yb14];

xcar10=x0+scale_x*[xb15];
ycar10=y0+scale_y*[yb15];

xcar10_1=x0+scale_x*xb15_1;
ycar10_1=y0+scale_y*yb15_1;

xcar10_2=x0+scale_x*xb15_2;
ycar10_2=y0+scale_y*yb15_2;

xcar10_3=x0+scale_x*xb15_3;
```

```
ycar10_3=y0+scale_y*yb15_3;

xcar11=x0+scale_x*[xb16];
ycar11=y0+scale_y*[yb16];

xcar11_1=x0+scale_x*xb16_1;
ycar11_1=y0+scale_y*yb16_1;

xcar11_2=x0+scale_x*xb16_2;
ycar11_2=y0+scale_y*yb16_2;

xcar11_3=x0+scale_x*xb16_3;
ycar11_3=y0+scale_y*yb16_3;

xcar12=x0+scale_x*xb17;
ycar12=y0+scale_y*yb17;

xcar13=x0+scale_x*xb18;
ycar13=y0+scale_y*yb18;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xccar1=cx0+scale_cx*[xb1,xb2,xb3,xb4,xb5,xb6,xb7,xb8,xb9];
yccar1=cy0+scale_cy*[yb1,yb2,yb3,yb4,yb5,yb6,yb7,yb8,yb9];

xccar2=cx0+scale_cx*[xb10];
yccar2=cy0+scale_cy*[yb10];

xccar3=cx0+scale_cx*[-2.5,-2.55,-2.55,-2.5];
yccar3=cy0+scale_cy*(yb10_edge+[0.0,0.0,0.3,0.3]);

xccar4=cx0+scale_cx*[-2.5,-2.5,-1.20,-1.19];
yccar4=cy0+scale_cy*(yb10_edge+[0.04,-0.38,-0.38,0.007]);

xccar5=cx0+scale_cx*[-2.49,-2.49,-1.21,-1.20];
yccar5=cy0+scale_cy*(yb10_edge+[0.035,-0.37,-0.37,0.002]);

xccar6=cx0+scale_cx*[xb11];
yccar6=cy0+scale_cy*[yb11];

xccar7=cx0+scale_cx*[xb12];
yccar7=cy0+scale_cy*[yb12];

xccar8=cx0+scale_cx*[xb13];
yccar8=cy0+scale_cy*[yb13];

xccar9=cx0+scale_cx*[xb14];
yccar9=cy0+scale_cy*[yb14];

xccar10=cx0+scale_cx*[xb15];
yccar10=cy0+scale_cy*[yb15];

xccar10_1=cx0+scale_cx*xb15_1;
yccar10_1=cy0+scale_cy*yb15_1;

xccar10_2=cx0+scale_cx*xb15_2;
yccar10_2=cy0+scale_cy*yb15_2;
```

```
xccar10_3=cx0+scale_cx*xb15_3;
yccar10_3=cy0+scale_cy*yb15_3;

xccar11=cx0+scale_cx*[xb16];
yccar11=cy0+scale_cy*[yb16];

xccar11_1=x0+scale_cx*xb16_1;
yccar11_1=y0+scale_cy*yb16_1;

xccar11_2=cx0+scale_cx*xb16_2;
yccar11_2=cy0+scale_cy*yb16_2;

xccar11_3=cx0+scale_cx*xb16_3;
yccar11_3=cy0+scale_cy*yb16_3;

xccar12=cx0+scale_cx*xb17;
yccar12=cy0+scale_cy*yb17;

xccar13=cx0+scale_cx*xb18;
yccar13=cy0+scale_cy*yb18;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xline0=[2.2,2.2+1.0,2.2+1.0,2.2]-1*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline0=[1.05,1.05,1.15,1.15];

xline1=[2.2,2.2+1.0,2.2+1.0,2.2]-(xx)*18.0*(xmax/1200)/jjmax;
yline1=[1.05,1.05,1.15,1.15];

xline2=[2.2,2.2+1.0,2.2+1.0,2.2]+1*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline2=[1.05,1.05,1.15,1.15];

xline3=[2.2,2.2+1.0,2.2+1.0,2.2]+2*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline3=[1.05,1.05,1.15,1.15];

xline4=[2.2,2.2+1.0,2.2+1.0,2.2]+3*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline4=[1.05,1.05,1.15,1.15];

xline5=[2.2,2.2+1.0,2.2+1.0,2.2]+4*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline5=[1.05,1.05,1.15,1.15];

xline6=[2.2,2.2+1.0,2.2+1.0,2.2]+5*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline6=[1.05,1.05,1.15,1.15];

xline7=[2.2,2.2+1.0,2.2+1.0,2.2]+6*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline7=[1.05,1.05,1.15,1.15];

xline8=[2.2,2.2+1.0,2.2+1.0,2.2]+7*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline8=[1.05,1.05,1.15,1.15];

xline9=[2.2,2.2+1.0,2.2+1.0,2.2]+8*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline9=[1.05,1.05,1.15,1.15];

xline10=[2.2,2.2+1.0,2.2+1.0,2.2]+9*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline10=[1.05,1.05,1.15,1.15];
```

```
xline11=[2.2,2.2+1.0,2.2+1.0,2.2]+10*2.0-(xx)*18.0*(xmax/1200)/jjmax;
yline11=[1.05,1.05,1.15,1.15];

xline_begin=[1.75,1.95,2.05,1.90]-(xx)*18.0*(xmax/1200)/jjmax;
yline_begin=[0.6,0.6,1.6,1.6];

xline_end=[1.75,1.95,2.05,1.90]+9*2.0*(xmax/1200)-
(xx)*18.0*(xmax/1200)/jjmax;
yline_end=[0.6,0.6,1.6,1.6];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%


%subplot(2,1,1)
axes(handles.axes4)
axis off;


fill(xupoBa8ro,yupoBa8ro,[1.0,1.0,1.0],...
     xfield1,yfield1,[0.2,0.8,0.2],...
     xroad,yroad,[0.4,0.4,0.4],...
     xfield2,yfield2,[0.2,0.8,0.2],...
     xline0,yline0,[0.9,0.9,0.9],...
     xline1,yline1,[0.9,0.9,0.9],...
     xline2,yline2,[0.9,0.9,0.9],...
     xline3,yline3,[0.9,0.9,0.9],...
     xline4,yline4,[0.9,0.9,0.9],...
     xline5,yline5,[0.9,0.9,0.9],...
     xline6,yline6,[0.9,0.9,0.9],...
     xline7,yline7,[0.9,0.9,0.9],...
     xline8,yline8,[0.9,0.9,0.9],...
     xline9,yline9,[0.9,0.9,0.9],...
     xline10,yline10,[0.9,0.9,0.9],...
     xline11,yline11,[0.9,0.9,0.9],...
     xline_begin,yline_begin,[0.9,0.3,0.3],...
     xline_end,yline_end,[0.9,0.9,0.3],...
     xcar1,ycar1,[0.3,0.5,0.8],...
     xcar2,ycar2,[0.9,0.9,0.9],...
     xcar3,ycar3,[0.3,0.5,0.8],...
     xcar4,ycar4,[0.4,0.4,0.4],...
     xcar5,ycar5,[0.3,0.5,0.8],...
     xcar6,ycar6,[0.4,0.4,0.4],...
     xcar7,ycar7,[0.8,0.8,0.8],...
     xcar8,ycar8,[0.4,0.4,0.4],...
     xcar9,ycar9,[0.8,0.8,0.8],...
     xcar10,ycar10,[0.6,0.6,0.6],...
     xcar10_1,ycar10_1,[0.6,0.6,0.6],...
     xcar10_2,ycar10_2,[0.6,0.6,0.6],...
     xcar10_3,ycar10_3,[0.6,0.6,0.6],...
     xcar11,ycar11,[0.6,0.6,0.6],...
     xcar11_1,ycar11_1,[0.6,0.6,0.6],...
     xcar11_2,ycar11_2,[0.6,0.6,0.6],...
     xcar11_3,ycar11_3,[0.6,0.6,0.6],...
     xcar12,ycar12,[0.8,0.6,0.6],...
     xcar13,ycar13,[0.8,0.6,0.6],...
     xvectorv,yvectorv,[0.8,0.2,0.8],...
     xvectora,yvectora,[0.8,0.8,0.2],...
     'Linestyle','None')

text(xgv,ygv-0.2,'v','Color',[0.8,0.2,0.8],'Fontsize',11)
text(xgv-0.25,ygv+0.5,'a','Color',[0.8,0.8,0.2],'Fontsize',11)


text(3.4,2.8,'t=','Fontsize',11)
text(3.525,2.8,ntt,'Fontsize',11)
text(3.78,2.8,'sec','Fontsize',11)

text(3.25,2.5,'v=','Fontsize',11)
text(3.40,2.5,nUU,'Fontsize',11)
text(3.62,2.5,'m/sec','Fontsize',11)


text(3.2,2.2,'x=','Fontsize',11)
text(3.35,2.2,nxx,'Fontsize',11)
text(3.78,2.2,'m','Fontsize',11)

axis([0.0,4.0,0.0,3.0])
axis off


%subplot(2,1,2)
axes(handles.axes5)
axis off;


fill(xupoBa8ro,yupoBa8ro,[1.0,1.0,1.0],...
     xcfield1,ycfield1,[0.2,0.8,0.2],...
     xcroad,ycroad,[0.4,0.4,0.4],...
     xcfield2,ycfield2,[0.2,0.8,0.2],...
     xcsky,ycsky,[0.7,0.7,0.9],...
     xcBouvo1,ycBouvo1,[0.2,0.6,0.2],...
     xcBouvo2,ycBouvo2,[0.3,0.5,0.3],...
     xcBouvo3,ycBouvo3,[0.25,0.45,0.25],...
     xcline1,ycline1,[0.9,0.9,0.9],...
     xcline2,ycline2,[0.9,0.9,0.9],...
     xcline3,ycline3,[0.9,0.9,0.9],...
     xcline4,ycline4,[0.9,0.9,0.9],...
     xcline5,ycline5,[0.9,0.9,0.9],...
     xcline6,ycline6,[0.9,0.9,0.9],...
     xcline7,ycline7,[0.9,0.9,0.9],...
     xcline8,ycline8,[0.9,0.9,0.9],...
     xcline9,ycline9,[0.9,0.9,0.9],...
     xcline10,ycline10,[0.9,0.9,0.9],...
     xcline_begin,ycline_begin,[0.9,0.3,0.3],...
     xcline_end,ycline_end,[0.9,0.9,0.3],...
     xccar1,yccar1,[0.3,0.5,0.8],...
     xccar2,yccar2,[0.9,0.9,0.9],...
     xccar3,yccar3,[0.3,0.5,0.8],...
     xccar4,yccar4,[0.4,0.4,0.4],...
     xccar5,yccar5,[0.3,0.5,0.8],...
     xccar6,yccar6,[0.4,0.4,0.4],...
     xccar7,yccar7,[0.8,0.8,0.8],...
     xccar8,yccar8,[0.4,0.4,0.4],...
     xccar9,yccar9,[0.8,0.8,0.8],...
     xccar10,yccar10,[0.6,0.6,0.6],...
     xccar10_1,yccar10_1,[0.6,0.6,0.6],...
     xccar10_2,yccar10_2,[0.6,0.6,0.6],...
     xccar10_3,yccar10_3,[0.6,0.6,0.6],...
     xccar11,yccar11,[0.6,0.6,0.6],...
     xccar11_1,yccar11_1,[0.6,0.6,0.6],...
     xccar11_2,yccar11_2,[0.6,0.6,0.6],...
     xccar11_3,yccar11_3,[0.6,0.6,0.6],...
     xccar12,yccar12,[0.8,0.6,0.6],...
     xccar13,yccar13,[0.8,0.6,0.6],...
     'Linestyle','None')

axis([0.0,4.0,0.0,3.0])
axis off

axes(handles.axes1)
axis off;
fill(tgr,agr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,2*a])
xlabel('t')
ylabel('a')

%subplot(1,3,2)
axes(handles.axes2)
axis off;
fill(tgr,vgr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,v+a*tmax])
xlabel('t')
ylabel('v')

%subplot(1,3,3)
axes(handles.axes3)
axis off;
fill(tgr,xgr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,v*tmax+0.5*a*tmax*tmax])
xlabel('t')
ylabel('x')

if (ii==1)
    pause(5.0)
end


pause(rryt)

end

tgr=0:0.01:tmax;
agr=a;
vgr=v+agr*tgr;
xgr=v*tgr+0.5*agr*tgr.*tgr;

%subplot(1,3,1)
axes(handles.axes1)
axis off;
plot(tgr,agr)
axis([0,tmax,0,2*agr])
xlabel('t')
ylabel('a')

%subplot(1,3,2)
```

```
axes(handles.axes2)
axis off;
plot(tgr,vgr)
axis([0,tmax,0,v+agr*tmax])
xlabel('t')
ylabel('v')

%subplot(1,3,3)
axes(handles.axes3)
axis off;
plot(tgr,xgr)
axis([0,tmax,0,v*tmax+0.5*agr*tmax*tmax])
xlabel('t')
ylabel('x')

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


% --- 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 stam;

if (stam==0)
    set(handles.pushbutton2,'string','Συνέχεια')
    stam=1;
elseif (stam==1)
   set(handles.pushbutton2,'string','Διακοπή')
   stam=0;
else
end
guidata(hObject, handles);

% --- 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 ryt;
global tmax;
global v;
global a;

axes(handles.axes1)
axis off;
cla
axes(handles.axes2)
axis off;
cla
axes(handles.axes3)
axis off;
cla
axes(handles.axes4)
axis off;
cla
```

```
axes(handles.axes5)
axis off;
cla


global status1;
status1=1;

clear ryt;
clear tmax;
clear v;
clear a;

set(handles.edit1,'enable','on','string','20');
set(handles.edit2,'enable','on','string','10');
set(handles.edit3,'enable','on','string','5');
set(handles.edit4,'enable','on','string','0.9');


set(handles.pushbutton1,'enable','on');
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 status;
hfin=questdlg('Έξοδος από το πρόγραμμα;');
switch hfin
    case 'Yes'
        status=1;
        closereq;
end



function varargout = g_epiBraduvomevn(varargin)
% G_EPIBRADUVOMEVN M-file for g_epiBraduvomevn.fig
%      G_EPIBRADUVOMEVN, by itself, creates a new G_EPIBRADUVOMEVN or
raises the existing
%      singleton*.
%
%      H = G_EPIBRADUVOMEVN returns the handle to a new
G_EPIBRADUVOMEVN or the handle to
%      the existing singleton*.
%
%      G_EPIBRADUVOMEVN('CALLBACK',hObject,eventData,handles,...)
calls the local
%       function named CALLBACK in G_EPIBRADUVOMEVN.M with the given
input arguments.
%
%      G_EPIBRADUVOMEVN('Property','Value',...) creates a new
G_EPIBRADUVOMEVN or raises the
%       existing singleton*.  Starting from the left, property value
pairs are
%        applied to the GUI before g_epiBraduvomevn_OpeningFcn gets
called.  An
```

```
%       unrecognized property name or invalid value makes property
application
%       stop.  All inputs are passed to g_epiBraduvomevn_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 g_epiBraduvomevn

% Last Modified by GUIDE v2.5 17-Feb-2014 22:48:43

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @g_epiBraduvomevn_OpeningFcn,
...
                   'gui_OutputFcn',  @g_epiBraduvomevn_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 g_epiBraduvomevn is made visible.
function g_epiBraduvomevn_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 g_epiBraduvomevn (see
VARARGIN)

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

% Update handles structure
guidata(hObject, handles);

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



% --- Outputs from this function are returned to the command line.
```

```
function varargout = g_epiBraduvomevn_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



function edit2_Callback(hObject, eventdata, handles)
% hObject    handle to edit2 (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 edit2 as text
%        str2double(get(hObject,'String')) returns contents of edit2
as a double


% --- Executes during object creation, after setting all properties.
function edit2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit2 (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



function edit3_Callback(hObject, eventdata, handles)
% hObject    handle to edit3 (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 edit3 as text
%        str2double(get(hObject,'String')) returns contents of edit3
as a double


% --- Executes during object creation, after setting all properties.
function edit3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit3 (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;
global a;
global v;

v=str2double(get(handles.edit1,'String'));
a=str2double(get(handles.edit2,'String'));
ryt=str2double(get(handles.edit3,'String'));

global stam;

stam=0;
set(handles.pushbutton2,'string','Διακοπή');

global status;
status=0;

global status1;
status1=0;
```

```
rryt=1.005-ryt;

if (ryt>1|ryt<0.001)
    h=warndlg('Βάλτε στο ρυθμό προσομοίωσης τιμή μεταξύ 0.001 και
1.0');
    return
end

if (a>1.5|a<1)
    h=warndlg('Βάλτε στην επιβράδυνση τιμή μεταξύ 1 και 1.5');
    return
end

if (v>10|v<5)
    h=warndlg('Βάλτε στη ταχύτητα τιμή μεταξύ 10 και 20');
    return
end

set(handles.edit1,'enable','off');
set(handles.edit2,'enable','off');
set(handles.edit3,'enable','off');

set(handles.pushbutton1,'enable','off');

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
scale_x=0.35;
scale_y=0.7;

scale_cx=0.07;
scale_cy=0.17;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%5<=v<=10;
%10<=t<=20;
%1<=a<=1.5;
%v=10;
%a=1.0;
tmax=v/a;
xmax=v*tmax-0.5*a*tmax*tmax;
%xmegisto=1200
%xelaxisto=100
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% x=imread('moderncar','jpg');
% image(x);
xupoBa8ro=[0.0,4.0,4.0,0.0];
yupoBa8ro=[0.0,0.0,3.0,3.0];


x0=1.8;
y0=1.0;

th0=0:0.01:2*pi;

th1=0:0.01:pi/2;
xb1=-0.4+0.4*cos(th1);
```

```
yb1=0.0+0.25*sin(th1);

th1_1=pi/2:-0.01:0;
xb1_1=-0.4+0.3*cos(th1_1);
yb1_1=0.0+0.25*sin(th1_1);

xb2=-0.4:-0.01:-3.6;
yb2=(0.25-0.45*exp(-1.1*1.8^2))+0.45*exp(-1.1*(xb2+2.2).^2);
yb2_edge=(0.25-0.5*exp(-1.1*1.8^2))+0.5*exp(-1.1*(-3.6+2.2).^2);

th3=pi/2:0.01:pi;
xb3=-3.6+0.1*cos(th3);
yb3=yb2_edge-0.2+0.2*sin(th3);

th3_1=0:0.01:pi/2;
xb3_1=-3.58+0.04*cos(th3_1);
yb3_1=yb2_edge-0.2+0.2*sin(th3_1);

th4=pi:0.01:3*pi/2;
xb4=-3.6+0.1*cos(th4);
yb4=yb2_edge-0.2+0.2*sin(th4);

xb5=-2.9;
yb5=yb2_edge-0.4;

th6=pi:-0.01:0.0;
xb6=-2.9+0.25*cos(th6);
yb6=yb5+0.25*sin(th6);

xb7=-1.1;
yb7=yb5;

th8=pi:-0.01:0.0;
xb8=-0.85+0.25*cos(th8);
yb8=yb5+0.25*sin(th8);

th9=3*pi/2:0.01:2*pi;
xb9=-0.5+0.5*cos(th9);
yb9=0.0-yb5*sin(th9);

xb10=-1.1:-0.01:-3.0;
yb10=(0.24-0.40*exp(-1.1*1.8^2))+0.40*exp(-1.1*(xb10+2.2).^2);
yb10_edge=(0.24-0.40*exp(-1.1*1.8^2))+0.40*exp(-1.1*(-1.1+2.2).^2);

th11=0.0:0.01:2*pi;
xb11=-2.9+0.23*cos(th11);
yb11=yb5+0.23*sin(th11);

th12=0.0:0.01:2*pi;
xb12=-2.9+0.17*cos(th12);
yb12=yb5+0.17*sin(th12);

th13=0.0:0.01:2*pi;
xb13=-0.85+0.23*cos(th13);
yb13=yb5+0.23*sin(th13);

th14=0.0:0.01:2*pi;
xb14=-0.85+0.17*cos(th14);
```

```
yb14=yb5+0.17*sin(th14);

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%ryt=0.9;
%rryt=1.005-ryt;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xcfield1=[0.0,4.0,4.0,0.0];
ycfield1=[0.0,0.0,0.8,0.8];

xcroad=[0.0,4.0,4.0,0.0];
ycroad=[0.8,0.8,1.2,1.2];

xcfield2=[0.0,4.0,4.0,0.0];
ycfield2=[1.2,1.2,2.2,2.2];

xcsky=[0.0,4.0,4.0,0.0];
ycsky=[2.2,2.2,3.0,3.0];

xB1=0.1:0.01:1.5;
xcBouvo1=[0.1,xB1,1.5];
ycBouvo1=[1.9,1.9+1.0*exp(-6.1*(xB1-0.8).^2),1.9];

xB2=1.4:0.01:3.6;
xcBouvo2=[1.4,xB2,3.6];
ycBouvo2=[2.0,2.0+0.7*exp(-2.1*(xB2-2.5).^2),2.0];

xB3=3.1:0.01:4.0;
xcBouvo3=[3.1,xB3,4.0];
ycBouvo3=[1.8,1.8+0.9*exp(-7.1*(xB3-4.0).^2),1.8];

xcline1=[0.0,0.2,0.2,0.0];
ycline1=[0.99,0.99,1.01,1.01];

xcline2=[0.0,0.2,0.2,0.0]+0.4;
ycline2=[0.99,0.99,1.01,1.01];

xcline3=[0.0,0.2,0.2,0.0]+2*0.4;
ycline3=[0.99,0.99,1.01,1.01];

xcline4=[0.0,0.2,0.2,0.0]+3*0.4;
ycline4=[0.99,0.99,1.01,1.01];

xcline5=[0.0,0.2,0.2,0.0]+4*0.4;
ycline5=[0.99,0.99,1.01,1.01];

xcline6=[0.0,0.2,0.2,0.0]+5*0.4;
ycline6=[0.99,0.99,1.01,1.01];

xcline7=[0.0,0.2,0.2,0.0]+6*0.4;
ycline7=[0.99,0.99,1.01,1.01];

xcline8=[0.0,0.2,0.2,0.0]+7*0.4;
ycline8=[0.99,0.99,1.01,1.01];

xcline9=[0.0,0.2,0.2,0.0]+8*0.4;
ycline9=[0.99,0.99,1.01,1.01];
```

```
xcline10=[0.0,0.2,0.2,0.0]+9*0.4;
ycline10=[0.99,0.99,1.01,1.01];

xcline_begin=[0.3,0.35,0.36,0.31];
ycline_begin=[0.8,0.8,1.2,1.2];

xcline_end=[0.3,0.35,0.36,0.31]+3.6*(xmax/50);
ycline_end=[0.8,0.8,1.2,1.2];



xfield1=[0.0,4.0,4.0,0.0];
yfield1=[0.0,0.0,0.6,0.6];

xroad=[0.0,4.0,4.0,0.0];
yroad=[0.6,0.6,1.6,1.6];

xfield2=[0.0,4.0,4.0,0.0];
yfield2=[1.6,1.6,3.0,3.0];

x0v=1.0;
y0v=1.8;
la=a*4.5/10;
lv=v*1.5/10;

xvectora=x0v+scale_x*[0.0,0.0,-la,-la,-la-0.2,-la,-la];
yvectora=y0v+scale_y*[0.075,-0.075,-0.075,-0.15,0.0,0.20,0.075]+0.6;

xgv=x0v+scale_x*lv/2;
ygv=y0v+0.5;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%%%%xmin=0.3
%%%%xmax=3.9
iimax=(11*(tmax/20)-1);
jjmax=v*tmax-0.5*a*tmax*tmax;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
for ii=1:0.1:11*(tmax/20)

    if (status1==1)
                return
            end

            if (status==1)
                closereq;
                return
            end

         if (stam==1)
            cc1=stam;
            while (cc1==1)
                cc1=stam;
                pause(0.01);
                if (status1==1)
                    return
                end
                if (status==1)
                    return
                end
            end
          end


tt=(ii-1)*tmax/(11*(tmax/20)-1);
xx=v*tt-0.5*a*tt*tt;
UU=v-a*tt;

lU=(1.1*v-a*tt)*1.5/10;

agr=a+(a/29)*sin(th0);
tgr=tt+(tmax/83)*cos(th0);
xgr=xx+(xmax/34)*sin(th0);
vgr=UU+(v/39)*sin(th0);

xvectorv=x0v+scale_x*[0.0,0.0,lU,lU,lU+0.2,lU,lU];
yvectorv=y0v+scale_y*[0.075,-0.075,-0.075,-0.15,0.0,0.20,0.075];



ntt=num2str(0.01*round(100*tt));
nxx=num2str(0.01*round(100*xx));
nUU=num2str(0.01*round(100*UU));

cx0=0.3+(xx/xmax)*(3.6*xmax/50);
cy0=1.0;


th15=0.0:0.01:2*pi;
xb15=-2.9+0.08*cos(th15);
yb15=yb5+0.08*sin(th15);

phi=0.0-(ii-1)*14*pi/iimax;

xb15_1=-2.9+[0.08*cos(phi-pi/12),0.17*cos(phi),0.08*cos(phi+pi/12)];
yb15_1=yb5+[0.08*sin(phi-pi/12),0.17*sin(phi),0.08*sin(phi+pi/12)];

xb15_2=-2.9+[0.08*cos(phi-
pi/12+2*pi/3),0.17*cos(phi+2*pi/3),0.08*cos(phi+pi/12+2*pi/3)];
yb15_2=yb5+[0.08*sin(phi-
pi/12+2*pi/3),0.17*sin(phi+2*pi/3),0.08*sin(phi+pi/12+2*pi/3)];

xb15_3=-2.9+[0.08*cos(phi-
pi/12+4*pi/3),0.17*cos(phi+4*pi/3),0.08*cos(phi+pi/12+4*pi/3)];
yb15_3=yb5+[0.08*sin(phi-
pi/12+4*pi/3),0.17*sin(phi+4*pi/3),0.08*sin(phi+pi/12+4*pi/3)];

th16=0.0:0.01:2*pi;
xb16=-0.85+0.08*cos(th16);
yb16=yb5+0.08*sin(th16);

xb16_1=-0.85+[0.08*cos(phi-pi/12),0.17*cos(phi),0.08*cos(phi+pi/12)];
yb16_1=yb5+[0.08*sin(phi-pi/12),0.17*sin(phi),0.08*sin(phi+pi/12)];
```

```
xb16_2=-0.85+[0.08*cos(phi-
pi/12+2*pi/3),0.17*cos(phi+2*pi/3),0.08*cos(phi+pi/12+2*pi/3)];
yb16_2=yb5+[0.08*sin(phi-
pi/12+2*pi/3),0.17*sin(phi+2*pi/3),0.08*sin(phi+pi/12+2*pi/3)];

xb16_3=-0.85+[0.08*cos(phi-
pi/12+4*pi/3),0.17*cos(phi+4*pi/3),0.08*cos(phi+pi/12+4*pi/3)];
yb16_3=yb5+[0.08*sin(phi-
pi/12+4*pi/3),0.17*sin(phi+4*pi/3),0.08*sin(phi+pi/12+4*pi/3)];

xb17=[xb3,xb3_1];
yb17=[yb3,yb3_1];

xb18=[xb1,xb1_1];
yb18=[yb1,yb1_1];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%


xcar1=x0+scale_x*[xb1,xb2,xb3,xb4,xb5,xb6,xb7,xb8,xb9];
ycar1=y0+scale_y*[yb1,yb2,yb3,yb4,yb5,yb6,yb7,yb8,yb9];

xcar2=x0+scale_x*[xb10];
ycar2=y0+scale_y*[yb10];

xcar3=x0+scale_x*[-2.5,-2.55,-2.55,-2.5];
ycar3=y0+scale_y*(yb10_edge+[0.0,0.0,0.3,0.3]);

xcar4=x0+scale_x*[-2.5,-2.5,-1.20,-1.19];
ycar4=y0+scale_y*(yb10_edge+[0.04,-0.38,-0.38,0.007]);

xcar5=x0+scale_x*[-2.475,-2.475,-1.21,-1.20];
ycar5=y0+scale_y*(yb10_edge+[0.035,-0.37,-0.37,0.002]);

xcar6=x0+scale_x*[xb11];
ycar6=y0+scale_y*[yb11];

xcar7=x0+scale_x*[xb12];
ycar7=y0+scale_y*[yb12];

xcar8=x0+scale_x*[xb13];
ycar8=y0+scale_y*[yb13];

xcar9=x0+scale_x*[xb14];
ycar9=y0+scale_y*[yb14];

xcar10=x0+scale_x*[xb15];
ycar10=y0+scale_y*[yb15];

xcar10_1=x0+scale_x*xb15_1;
ycar10_1=y0+scale_y*yb15_1;

xcar10_2=x0+scale_x*xb15_2;
ycar10_2=y0+scale_y*yb15_2;

xcar10_3=x0+scale_x*xb15_3;
```

```
ycar10_3=y0+scale_y*yb15_3;

xcar11=x0+scale_x*[xb16];
ycar11=y0+scale_y*[yb16];

xcar11_1=x0+scale_x*xb16_1;
ycar11_1=y0+scale_y*yb16_1;

xcar11_2=x0+scale_x*xb16_2;
ycar11_2=y0+scale_y*yb16_2;

xcar11_3=x0+scale_x*xb16_3;
ycar11_3=y0+scale_y*yb16_3;

xcar12=x0+scale_x*xb17;
ycar12=y0+scale_y*yb17;

xcar13=x0+scale_x*xb18;
ycar13=y0+scale_y*yb18;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xccar1=cx0+scale_cx*[xb1,xb2,xb3,xb4,xb5,xb6,xb7,xb8,xb9];
yccar1=cy0+scale_cy*[yb1,yb2,yb3,yb4,yb5,yb6,yb7,yb8,yb9];

xccar2=cx0+scale_cx*[xb10];
yccar2=cy0+scale_cy*[yb10];

xccar3=cx0+scale_cx*[-2.5,-2.55,-2.55,-2.5];
yccar3=cy0+scale_cy*(yb10_edge+[0.0,0.0,0.3,0.3]);

xccar4=cx0+scale_cx*[-2.5,-2.5,-1.20,-1.19];
yccar4=cy0+scale_cy*(yb10_edge+[0.04,-0.38,-0.38,0.007]);

xccar5=cx0+scale_cx*[-2.49,-2.49,-1.21,-1.20];
yccar5=cy0+scale_cy*(yb10_edge+[0.035,-0.37,-0.37,0.002]);

xccar6=cx0+scale_cx*[xb11];
yccar6=cy0+scale_cy*[yb11];

xccar7=cx0+scale_cx*[xb12];
yccar7=cy0+scale_cy*[yb12];

xccar8=cx0+scale_cx*[xb13];
yccar8=cy0+scale_cy*[yb13];

xccar9=cx0+scale_cx*[xb14];
yccar9=cy0+scale_cy*[yb14];

xccar10=cx0+scale_cx*[xb15];
yccar10=cy0+scale_cy*[yb15];

xccar10_1=cx0+scale_cx*xb15_1;
yccar10_1=cy0+scale_cy*yb15_1;

xccar10_2=cx0+scale_cx*xb15_2;
yccar10_2=cy0+scale_cy*yb15_2;
```

```
xccar10_3=cx0+scale_cx*xb15_3;
yccar10_3=cy0+scale_cy*yb15_3;

xccar11=cx0+scale_cx*[xb16];
yccar11=cy0+scale_cy*[yb16];

xccar11_1=x0+scale_cx*xb16_1;
yccar11_1=y0+scale_cy*yb16_1;

xccar11_2=cx0+scale_cx*xb16_2;
yccar11_2=cy0+scale_cy*yb16_2;

xccar11_3=cx0+scale_cx*xb16_3;
yccar11_3=cy0+scale_cy*yb16_3;

xccar12=cx0+scale_cx*xb17;
yccar12=cy0+scale_cy*yb17;

xccar13=cx0+scale_cx*xb18;
yccar13=cy0+scale_cy*yb18;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
xline0=[2.2,2.2+1.0,2.2+1.0,2.2]-1*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline0=[1.05,1.05,1.15,1.15];

xline1=[2.2,2.2+1.0,2.2+1.0,2.2]-(xx)*18.0*(xmax/50)/jjmax;
yline1=[1.05,1.05,1.15,1.15];

xline2=[2.2,2.2+1.0,2.2+1.0,2.2]+1*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline2=[1.05,1.05,1.15,1.15];

xline3=[2.2,2.2+1.0,2.2+1.0,2.2]+2*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline3=[1.05,1.05,1.15,1.15];

xline4=[2.2,2.2+1.0,2.2+1.0,2.2]+3*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline4=[1.05,1.05,1.15,1.15];

xline5=[2.2,2.2+1.0,2.2+1.0,2.2]+4*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline5=[1.05,1.05,1.15,1.15];

xline6=[2.2,2.2+1.0,2.2+1.0,2.2]+5*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline6=[1.05,1.05,1.15,1.15];

xline7=[2.2,2.2+1.0,2.2+1.0,2.2]+6*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline7=[1.05,1.05,1.15,1.15];

xline8=[2.2,2.2+1.0,2.2+1.0,2.2]+7*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline8=[1.05,1.05,1.15,1.15];

xline9=[2.2,2.2+1.0,2.2+1.0,2.2]+8*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline9=[1.05,1.05,1.15,1.15];

xline10=[2.2,2.2+1.0,2.2+1.0,2.2]+9*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline10=[1.05,1.05,1.15,1.15];
```

```
xline11=[2.2,2.2+1.0,2.2+1.0,2.2]+10*2.0-(xx)*18.0*(xmax/50)/jjmax;
yline11=[1.05,1.05,1.15,1.15];

xline_begin=[1.75,1.95,2.05,1.90]-(xx)*18.0*(xmax/50)/jjmax;
yline_begin=[0.6,0.6,1.6,1.6];

xline_end=[1.75,1.95,2.05,1.90]+9*2.0*(xmax/50)-
(xx)*18.0*(xmax/50)/jjmax;
yline_end=[0.6,0.6,1.6,1.6];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%


%subplot(2,1,1)
axes(handles.axes4)
axis off;



fill(xupoBa8ro,yupoBa8ro,[1.0,1.0,1.0],...
     xfield1,yfield1,[0.2,0.8,0.2],...
     xroad,yroad,[0.4,0.4,0.4],...
     xfield2,yfield2,[0.2,0.8,0.2],...
     xline0,yline0,[0.9,0.9,0.9],...
     xline1,yline1,[0.9,0.9,0.9],...
     xline2,yline2,[0.9,0.9,0.9],...
     xline3,yline3,[0.9,0.9,0.9],...
     xline4,yline4,[0.9,0.9,0.9],...
     xline5,yline5,[0.9,0.9,0.9],...
     xline6,yline6,[0.9,0.9,0.9],...
     xline7,yline7,[0.9,0.9,0.9],...
     xline8,yline8,[0.9,0.9,0.9],...
     xline9,yline9,[0.9,0.9,0.9],...
     xline10,yline10,[0.9,0.9,0.9],...
     xline11,yline11,[0.9,0.9,0.9],...
     xline_begin,yline_begin,[0.9,0.3,0.3],...
     xline_end,yline_end,[0.9,0.9,0.3],...
     xcar1,ycar1,[0.3,0.5,0.8],...
     xcar2,ycar2,[0.9,0.9,0.9],...
     xcar3,ycar3,[0.3,0.5,0.8],...
     xcar4,ycar4,[0.4,0.4,0.4],...
     xcar5,ycar5,[0.3,0.5,0.8],...
     xcar6,ycar6,[0.4,0.4,0.4],...
     xcar7,ycar7,[0.8,0.8,0.8],...
     xcar8,ycar8,[0.4,0.4,0.4],...
     xcar9,ycar9,[0.8,0.8,0.8],...
     xcar10,ycar10,[0.6,0.6,0.6],...
     xcar10_1,ycar10_1,[0.6,0.6,0.6],...
     xcar10_2,ycar10_2,[0.6,0.6,0.6],...
     xcar10_3,ycar10_3,[0.6,0.6,0.6],...
     xcar11,ycar11,[0.6,0.6,0.6],...
     xcar11_1,ycar11_1,[0.6,0.6,0.6],...
     xcar11_2,ycar11_2,[0.6,0.6,0.6],...
     xcar11_3,ycar11_3,[0.6,0.6,0.6],...
     xcar12,ycar12,[0.8,0.6,0.6],...
     xcar13,ycar13,[0.8,0.6,0.6],...
     xvectorv,yvectorv,[0.8,0.2,0.8],...
     xvectora,yvectora,[0.8,0.8,0.2],...
     'Linestyle','None')
```

```
text(xgv,ygv-0.2,'v','Color',[0.8,0.2,0.8],'Fontsize',11)
text(xgv-0.25,ygv+0.5,'a','Color',[0.8,0.8,0.2],'Fontsize',11)


text(3.4,2.8,'t=','Fontsize',11)
text(3.525,2.8,ntt,'Fontsize',11)
text(3.78,2.8,'sec','Fontsize',11)

text(3.20,2.5,'v=','Fontsize',11)
text(3.35,2.5,nUU,'Fontsize',11)
text(3.62,2.5,'m/sec','Fontsize',11)


text(3.2,2.2,'x=','Fontsize',11)
text(3.35,2.2,nxx,'Fontsize',11)
text(3.78,2.2,'m','Fontsize',11)

axis([0.0,4.0,0.0,3.0])
axis off


%subplot(2,1,2)
axes(handles.axes5)
axis off;



fill(xupoBa8ro,yupoBa8ro,[1.0,1.0,1.0],...
     xcfield1,ycfield1,[0.2,0.8,0.2],...
     xcroad,ycroad,[0.4,0.4,0.4],...
     xcfield2,ycfield2,[0.2,0.8,0.2],...
     xcsky,ycsky,[0.7,0.7,0.9],...
     xcBouvo1,ycBouvo1,[0.2,0.6,0.2],...
     xcBouvo2,ycBouvo2,[0.3,0.5,0.3],...
     xcBouvo3,ycBouvo3,[0.25,0.45,0.25],...
     xcline1,ycline1,[0.9,0.9,0.9],...
     xcline2,ycline2,[0.9,0.9,0.9],...
     xcline3,ycline3,[0.9,0.9,0.9],...
     xcline4,ycline4,[0.9,0.9,0.9],...
     xcline5,ycline5,[0.9,0.9,0.9],...
     xcline6,ycline6,[0.9,0.9,0.9],...
     xcline7,ycline7,[0.9,0.9,0.9],...
     xcline8,ycline8,[0.9,0.9,0.9],...
     xcline9,ycline9,[0.9,0.9,0.9],...
     xcline10,ycline10,[0.9,0.9,0.9],...
     xcline_begin,ycline_begin,[0.9,0.3,0.3],...
     xcline_end,ycline_end,[0.9,0.9,0.3],...
     xccar1,yccar1,[0.3,0.5,0.8],...
     xccar2,yccar2,[0.9,0.9,0.9],...
     xccar3,yccar3,[0.3,0.5,0.8],...
     xccar4,yccar4,[0.4,0.4,0.4],...
     xccar5,yccar5,[0.3,0.5,0.8],...
     xccar6,yccar6,[0.4,0.4,0.4],...
     xccar7,yccar7,[0.8,0.8,0.8],...
     xccar8,yccar8,[0.4,0.4,0.4],...
     xccar9,yccar9,[0.8,0.8,0.8],...
     xccar10,yccar10,[0.6,0.6,0.6],...
     xccar10_1,yccar10_1,[0.6,0.6,0.6],...
     xccar10_2,yccar10_2,[0.6,0.6,0.6],...
     xccar10_3,yccar10_3,[0.6,0.6,0.6],...
     xccar11,yccar11,[0.6,0.6,0.6],...
     xccar11_1,yccar11_1,[0.6,0.6,0.6],...
     xccar11_2,yccar11_2,[0.6,0.6,0.6],...
     xccar11_3,yccar11_3,[0.6,0.6,0.6],...
     xccar12,yccar12,[0.8,0.6,0.6],...
     xccar13,yccar13,[0.8,0.6,0.6],...
     'Linestyle','None')

axis([0.0,4.0,0.0,3.0])
axis off

axes(handles.axes1)
axis off;
fill(tgr,agr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,2*a])
xlabel('t')
ylabel('a')

%subplot(1,3,2)
axes(handles.axes2)
axis off;
fill(tgr,vgr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,v+a*tmax])
xlabel('t')
ylabel('v')

%subplot(1,3,3)
axes(handles.axes3)
axis off;
fill(tgr,xgr,[0.8,0.2,0.2],...
    'Linestyle','None')
axis([0,tmax,0,v*tmax+0.5*a*tmax*tmax])
xlabel('t')
ylabel('x')

if (ii==1)
    pause(5.0)
end


pause(rryt)

end

tgr=0:0.01:tmax;
agr=a;
vgr=v-agr*tgr;
xgr=v*tgr-0.5*agr*tgr.*tgr;

%subplot(1,3,1)
axes(handles.axes1)
axis off;


plot(tgr,agr)
axis([0,tmax,0,2*agr])
```

```
xlabel('t')
ylabel('a')


%subplot(1,3,2)
axes(handles.axes2)
axis off;


plot(tgr,vgr)
axis([0,tmax,0,v+agr*tmax])
xlabel('t')
ylabel('v')


%subplot(1,3,3)
axes(handles.axes3)
axis off;


plot(tgr,xgr)
axis([0,tmax,0,v*tmax+0.5*agr*tmax*tmax])
xlabel('t')
ylabel('x')


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


% --- 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 stam;

if (stam==0)
    set(handles.pushbutton2,'string','Συνέχεια')
    stam=1;
elseif (stam==1)
   set(handles.pushbutton2,'string','Διακοπή')
   stam=0;
else
end
guidata(hObject, handles);


% --- 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 ryt;
global a;
global v;

axes(handles.axes1)
```

```
axis off;
cla
axes(handles.axes2)
axis off;
cla
axes(handles.axes3)
axis off;
cla
axes(handles.axes4)
axis off;
cla
axes(handles.axes5)
axis off;
cla


global status1;
status1=1;

clear ryt;
clear a;
clear v;

set(handles.edit1,'enable','on','string','10');
set(handles.edit2,'enable','on','string','1');
set(handles.edit3,'enable','on','string','0.9');


set(handles.pushbutton1,'enable','on');
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 status;
hfin=questdlg('Έξοδος από το πρόγραμμα;');
switch hfin
    case 'Yes'
        status=1;
        closereq;
end
```

ΒΙΒΛΙΟΓΡΑΦΙΑ

Έντυπη:

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