MATLAB programming course for beginners, supported by Wagatsuma Lab@Kyutech

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Specifications and requirements

1. @Time : 2021-1-16
2. @Author : Hiroaki Wagatsuma
3. @Site : https://github.com/hirowgit/1B0_matla_optmization_course
4. @IDE : MATLAB R2018a
5. @File : A3_Objects_and_Path_Plus.m

Main program

clear all

```
clc

A1_ExcelRead_and_Plot_Normal;
```

```
contr=[-0.15,0.15,0.7,0.7,-0.7,-0.7,-0.15,-0.15,0.15,0.15;1,1,1,-1,-1,1,1,-1,-1,1]
gAng=@(x1,y1,x2,y2) atan2(y2-y1,x2-x1);
RotM=@(theta) [cos(theta),-sin(theta);sin(theta),cos(theta)];

% Pcontr=RotM(gAng(x1,y1,x2,y2))*contr+repmat([x1;y1],
[1,size(contr,2)]);


% ~~~~~~~~~MakeQTMovie <initialize> (start)~~~~~~~~~~~~~~
% You need to place "MakeQTMovie.m" (c) Copyright Malcolm Slaney,
 Interval Research, March 1999.
% in the same folder of this file

Flag_write_Movie=1;
Nm=1; % the serial number of the movie
f_folder='movie'; % the output folder of the movie
if ~isdir(f_folder); mkdir(f_folder); end
f_prefix='outputMoviePathM_c_'; % the output file name
if Flag_write_Movie == 1
    MovieFileName = strcat(f_prefix,num2str(Nm),'.mov');
    fprintf('Creating the movie file %s.\n',
 fullfile(f_folder,MovieFileName));
    MakeQTMovie('start',fullfile(f_folder,MovieFileName));
    MakeQTMovie('size', [480 360]);
    MakeQTMovie('quality', 1.0);
%     fps = 10;
  fps = 30;
end
% ~~~~~~~~~MakeQTMovie (end)~~~~~~~~~~~~~~

xRange=[50 200];
yRange=[50 200];
cmap1=colormap('Lines');

figure(4); clf
Dlen=[];
for i=1:Lsize
    sTraj_full=lineD2{i};
    Dlen(i)=length(sTraj_full);

 pp0{i}=plot(sTraj_full(:,1),sTraj_full(:,2),'.-','lineWidth',2,'MarkerSize',20);
 hold on;
%     pp0{i}=plot(sTraj_full(:,1),sTraj_full(:,2),'k-'); hold on;
    axis equal; grid on; xlabel('x'); ylabel('y');
    grid on;
    title(['Object movements in the trajectory ']);

    xx=1:size(contr,2);
    pp1{i}=plot(xx,xx,'Color',cmap1(i,:),'lineWidth',2);
%     set(pp{i},'erasemode','xor');

    set(gca,'xlim',xRange,'ylim',yRange);
end
Dlim=min(Dlen);
```

```
for k=1:Dlim-1

    for i=1:Lsize
        sTraj_full=lineD2{i};
        x1=sTraj_full(k,1); y1=sTraj_full(k,2);
        x2=sTraj_full(k+1,1); y2=sTraj_full(k+1,2);
        Pcontr=RotM(gAng(x1,y1,x2,y2))*contr+repmat([x1;y1],
[1,size(contr,2)]);

        set(pp1{i},'XData',Pcontr(1,:),'YData',Pcontr(2,:));
%
 plot(Pcontr(1,:),Pcontr(2,:),'.-','lineWidth',2,'MarkerSize',20),hold
 on;


        % ~~~~~~~~~MakeQTMovie <add a frame> (start)~~~~~~~~~~~~~~
        if Flag_write_Movie == 1
            MakeQTMovie('addfigure');
        end
        % ~~~~~~~~~MakeQTMovie (end)~~~~~~~~~~~~~~

    %     pause(0.2);
    %     drawnow;
%         hold off
    end
end

% ~~~~~~~~~MakeQTMovie  <finalize> (start)~~~~~~~~~~~~~~
if Flag_write_Movie == 1
    MakeQTMovie('framerate', fps);
    MakeQTMovie('finish');
    strMessage=sprintf('Please find the generated mov file in the
 folder "%s" as filename "%s"',f_folder,MovieFileName);
    disp(strMessage);
end
% ~~~~~~~~~MakeQTMovie (end)~~~~~~~~~~~~~~




% ~~~~~~~~~MakeQTMovie <comment>~~~~~~~~~~~~~~
% The generated mov file is recommended to open QuickTime Player 7 in
 the first place and resave a new mov file by the player.
% The new mov file generated by the player can be opened with a recent
 version of the QuickTime Player.

% ~~~~~~~~~MakeQTMovie (end)~~~~~~~~~~~~~~


ans =

  struct with fields:
```

```
             Description: ''
                UserData: []
          DimensionNames: {'Row'  'Variables'}
           VariableNames: {1×9 cell}
     VariableDescriptions: {}
            VariableUnits: {}
      VariableContinuity: []
                RowNames: {}


ans =

   202     9


varnames =

  1×9 cell array

  Columns 1 through 7

    {'Var1'}    {'x1'}    {'y1'}    {'x2'}    {'y2'}    {'x3'}
 {'y3'}

  Columns 8 through 9

    {'x4'}    {'y4'}


x1 =

   72.0000
   72.0000
   72.0000
   73.0141
   74.0282
   75.0423
   76.0563
   77.0704
   78.0845
   79.0986
   80.1127
   81.1268
   82.1408
   83.1549
   84.1690
   85.1831
   86.1972
   87.2113
   88.2254
   89.2394
   90.2535
   91.2676
   92.2817
```

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  93.2958
  94.3099
  95.3239
  96.3380
  97.3521
  98.3662
  99.3803
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 105.4648
 106.4789
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 108.5070
 109.5211
 110.5352
 111.5493
 112.5634
 113.5775
 114.5915
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 116.6197
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 130.8169
 131.8310
 132.8451
 133.8592
 134.8732
 135.8873
 136.9014
 137.9155
 138.9296
 139.9437
 140.9577
 141.9718
 142.9859
 144.0000
 144.0000
 144.0727
 144.2853
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144.6296
145.0974
145.6804
146.3704
147.1591
148.0384
149.0000
150.0357
151.1372
152.2963
153.5048
154.7545
156.0370
157.3443
158.6680
160.0000
161.3320
162.6557
163.9630
165.2455
166.4952
167.7037
168.8628
169.9643
171.0000
171.0000
171.9634
172.8555
173.6790
174.4367
175.1312
175.7654
176.3420
176.8637
177.3333
177.7535
178.1271
178.4568
178.7453
178.9954
179.2099
179.3914
179.5428
179.6667
179.7659
179.8432
179.9012
179.9428
179.9707
179.9877
179.9963
179.9995
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y1 =

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54.0000
54.0000
54.0000
54.0000
54.0005
54.0037
54.0123
54.0293
54.0572
54.0988
54.1568
54.2341
54.3333
54.4572
54.6086
54.7901
```

```
   55.0046
   55.2547
   55.5432
   55.8729
   56.2465
   56.6667
   57.1363
   57.6580
   58.2346
   58.8688
   59.5633
   60.3210
   61.1445
   62.0366
   63.0000
   63.0000
   64.0357
   65.1372
   66.2963
   67.5048
   68.7545
   70.0370
   71.3443
   72.6680
   74.0000
   75.3320
   76.6557
   77.9630
   79.2455
   80.4952
   81.7037
   82.8628
   83.9643
   85.0000
   85.9616
   86.8409
   87.6296
   88.3196
   88.9026
   89.3704
   89.7147
   89.9273
   90.0000
   90.0000
   91.0141
   92.0282
   93.0423
   94.0563
   95.0704
   96.0845
   97.0986
   98.1127
   99.1268
  100.1408
```

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101.1549
102.1690
103.1831
104.1972
105.2113
106.2254
107.2394
108.2535
109.2676
110.2817
111.2958
112.3099
113.3239
114.3380
115.3521
116.3662
117.3803
118.3944
119.4085
120.4225
121.4366
122.4507
123.4648
124.4789
125.4930
126.5070
127.5211
128.5352
129.5493
130.5634
131.5775
132.5915
133.6056
134.6197
135.6338
136.6479
137.6620
138.6761
139.6901
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141.7183
142.7324
143.7465
144.7606
145.7746
146.7887
147.8028
148.8169
149.8310
150.8451
151.8592
152.8732
153.8873
154.9014
```

```
  155.9155
  156.9296
  157.9437
  158.9577
  159.9718
  160.9859
  162.0000


lineD =

  1×1 cell array

    {202×1 double}


lineD =

  1×1 cell array

    {202×2 double}


x2 =

   72.0000
   72.0000
   72.0000
   73.0141
   74.0282
   75.0423
   76.0563
   77.0704
   78.0845
   79.0986
   80.1127
   81.1268
   82.1408
   83.1549
   84.1690
   85.1831
   86.1972
   87.2113
   88.2254
   89.2394
   90.2535
   91.2676
   92.2817
   93.2958
   94.3099
   95.3239
   96.3380
   97.3521
   98.3662
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```
   99.3803
  100.3944
  101.4085
  102.4225
  103.4366
  104.4507
  105.4648
  106.4789
  107.4930
  108.5070
  109.5211
  110.5352
  111.5493
  112.5634
  113.5775
  114.5915
  115.6056
  116.6197
  117.6338
  118.6479
  119.6620
  120.6761
  121.6901
  122.7042
  123.7183
  124.7324
  125.7465
  126.7606
  127.7746
  128.7887
  129.8028
  130.8169
  131.8310
  132.8451
  133.8592
  134.8732
  135.8873
  136.9014
  137.9155
  138.9296
  139.9437
  140.9577
  141.9718
  142.9859
  144.0000
  144.0000
  144.0916
  144.3590
  144.7914
  145.3776
  146.1067
  146.9676
  147.9495
  149.0413
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  150.2320
  151.5107
  152.8663
  154.2878
  155.7643
  157.2848
  158.8382
  160.4136
  162.0000
  162.0000
  163.1243
  164.2448
  165.3574
  166.4583
  167.5436
  168.6094
  169.6517
  170.6667
  171.6504
  172.5990
  173.5085
  174.3750
  175.1947
  175.9635
  176.6777
  177.3333
  177.9264
  178.4531
  178.9095
  179.2917
  179.5957
  179.8177
  179.9538
  180.0000
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y2 =

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72.0911
72.3542
72.7734
73.3333
74.0182
74.8125
75.7005
76.6667
77.6953
78.7708
79.8776
81.0000
82.1224
83.2292
84.3047
85.3333
86.2995
87.1875
87.9818
88.6667
89.2266
89.6458
89.9089
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     0

lineD =

  1×2 cell array

    {202×2 double}    {202×1 double}

lineD =

  1×2 cell array

    {202×2 double}    {202×2 double}

x3 =

  180.0000
  180.0000
  180.0000
  179.9722
  179.8900
  179.7553
  179.5698
  179.3354
  179.0538
  178.7269
  178.3566
  177.9445
  177.4925
  177.0025
  176.4763
  175.9155
  175.3222
  174.6981
  174.0449
  173.3646
  172.6589
  171.9296
  171.1785
  170.4076
  169.6185
  168.8131
  167.9932
  167.1606
  166.3171
  165.4645
  164.6047
  163.7395
  162.8707
  162.0000
  162.0000
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160.5803
159.1684
157.7723
156.3998
155.0588
153.7571
152.5027
151.3034
150.1671
149.1016
148.1149
147.2148
146.4091
145.7058
145.1127
144.6377
144.2887
144.0735
144.0000
144.0000
142.9859
141.9718
140.9577
139.9437
138.9296
137.9155
136.9014
135.8873
134.8732
133.8592
132.8451
131.8310
130.8169
129.8028
128.7887
127.7746
126.7606
125.7465
124.7324
123.7183
122.7042
121.6901
120.6761
119.6620
118.6479
117.6338
116.6197
115.6056
114.5915
113.5775
112.5634
111.5493
110.5352
109.5211
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  108.5070
  107.4930
  106.4789
  105.4648
  104.4507
  103.4366
  102.4225
  101.4085
  100.3944
   99.3803
   98.3662
   97.3521
   96.3380
   95.3239
   94.3099
   93.2958
   92.2817
   91.2676
   90.2535
   89.2394
   88.2254
   87.2113
   86.1972
   85.1831
   84.1690
   83.1549
   82.1408
   81.1268
   80.1127
   79.0986
   78.0845
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   76.0563
   75.0423
   74.0282
   73.0141
   72.0000
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y3 =

  126.0000
  126.0000
  126.0000
  125.1290
  124.2581
  123.3871
  122.5161
  121.6452
  120.7742
  119.9032
  119.0323
  118.1613
  117.2903
  116.4194
  115.5484
  114.6774
  113.8065
  112.9355
  112.0645
  111.1935
  110.3226
  109.4516
  108.5806
  107.7097
  106.8387
  105.9677
  105.0968
  104.2258
  103.3548
  102.4839
  101.6129
  100.7419
   99.8710
   99.0000
   99.0000
   97.6524
   96.4466
   95.3745
   94.4285
   93.6005
   92.8828
   92.2674
   91.7465
   91.3121
   90.9566
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90.6718
90.4501
90.2834
90.1640
90.0840
90.0354
90.0105
90.0013
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lineD =

  1×3 cell array
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    {202×2 double}    {202×2 double}    {202×1 double}


lineD =

  1×3 cell array

    {202×2 double}    {202×2 double}    {202×2 double}


x4 =

   72.0000
   72.0000
   72.0000
   73.0141
   74.0282
   75.0423
   76.0563
   77.0704
   78.0845
   79.0986
   80.1127
   81.1268
   82.1408
   83.1549
   84.1690
   85.1831
   86.1972
   87.2113
   88.2254
   89.2394
   90.2535
   91.2676
   92.2817
   93.2958
   94.3099
   95.3239
   96.3380
   97.3521
   98.3662
   99.3803
  100.3944
  101.4085
  102.4225
  103.4366
  104.4507
  105.4648
  106.4789
  107.4930
  108.5070
  109.5211
  110.5352
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111.5493
112.5634
113.5775
114.5915
115.6056
116.6197
117.6338
118.6479
119.6620
120.6761
121.6901
122.7042
123.7183
124.7324
125.7465
126.7606
127.7746
128.7887
129.8028
130.8169
131.8310
132.8451
133.8592
134.8732
135.8873
136.9014
137.9155
138.9296
139.9437
140.9577
141.9718
142.9859
144.0000
144.0000
144.0735
144.2887
144.6377
145.1127
145.7058
146.4091
147.2148
148.1149
149.1016
150.1671
151.3034
152.5027
153.7571
155.0588
156.3998
157.7723
159.1684
160.5803
162.0000
162.0000
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  162.8707
  163.7395
  164.6047
  165.4645
  166.3171
  167.1606
  167.9932
  168.8131
  169.6185
  170.4076
  171.1785
  171.9296
  172.6589
  173.3646
  174.0449
  174.6981
  175.3222
  175.9155
  176.4763
  177.0025
  177.4925
  177.9445
  178.3566
  178.7269
  179.0538
  179.3354
  179.5698
  179.7553
  179.8900
  179.9722
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y4 =

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   108.0105
   108.0354
   108.0840
   108.1640
   108.2834
   108.4501
   108.6718
   108.9566
   109.3121
   109.7465
   110.2674
   110.8828
   111.6005
   112.4285
   113.3745
   114.4466
   115.6524
   117.0000
   117.0000
   117.8710
   118.7419
   119.6129
   120.4839
   121.3548
   122.2258
   123.0968
   123.9677
   124.8387
   125.7097
```

```
  126.5806
  127.4516
  128.3226
  129.1935
  130.0645
  130.9355
  131.8065
  132.6774
  133.5484
  134.4194
  135.2903
  136.1613
  137.0323
  137.9032
  138.7742
  139.6452
  140.5161
  141.3871
  142.2581
  143.1290
  144.0000
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lineD =

  1×4 cell array

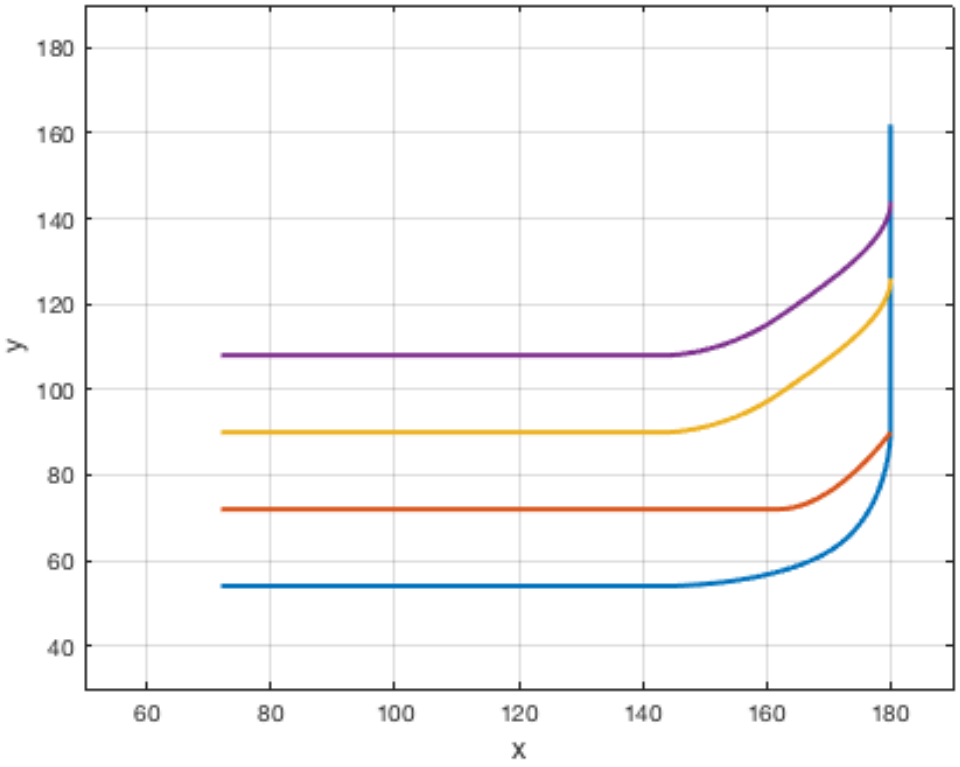
    {202×2 double}    {202×2 double}    {202×2 double}    {202×1
 double}

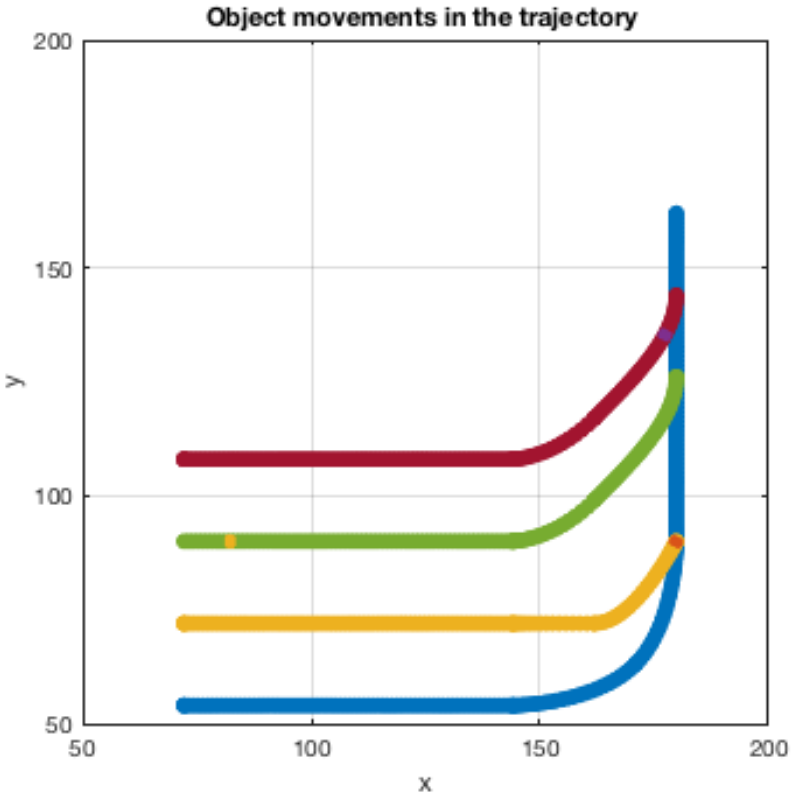

lineD =
```

```
  1×4 cell array

    {202×2 double}    {202×2 double}    {202×2 double}    {202×2
 double}

Creating the movie file movie/outputMoviePathM_c_1.mov.
Please find the generated mov file in the folder "movie" as filename
 "outputMoviePathM_c_1.mov"
```





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