

EULER ~ Another Scilab concept

April 11, 2009

Download and install Euler from here.

<http://mathsrv.ku-eichstaett.de/MGF/homes/grothmann/euler/>

The program is downloaded, and installed. The simplest thing to do next is to look at the documentation.

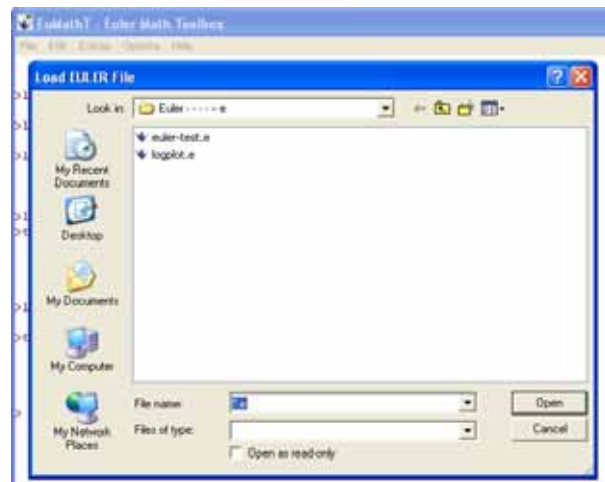
An overview:

<http://mathsrv.ku-eichstaett.de/MGF/homes/grothmann/euler/>

The manual itself:

<http://mathsrv.ku-eichstaett.de/MGF/homes/grothmann/euler/eulerdoc.html>

A simple program is then loaded by FILE, Load EULER File



The program is then loaded into Euler's "memory banks", and run. Euler programming syntax uses:-

| | |
|----------------------|--|
| ## | comments |
| .. | comments |
| ; | at end of a command to inhibit showing results on the log |
| printf | similar to, but more restricted than in C, C++, etc |
| string... | there are no string conversions from numeric values |
| <scope> | variables in a language structure, such as IF, FOR are local in nature, to access them outside, build a variable outside the structure, and assign it when in the IF, FOR, etc |

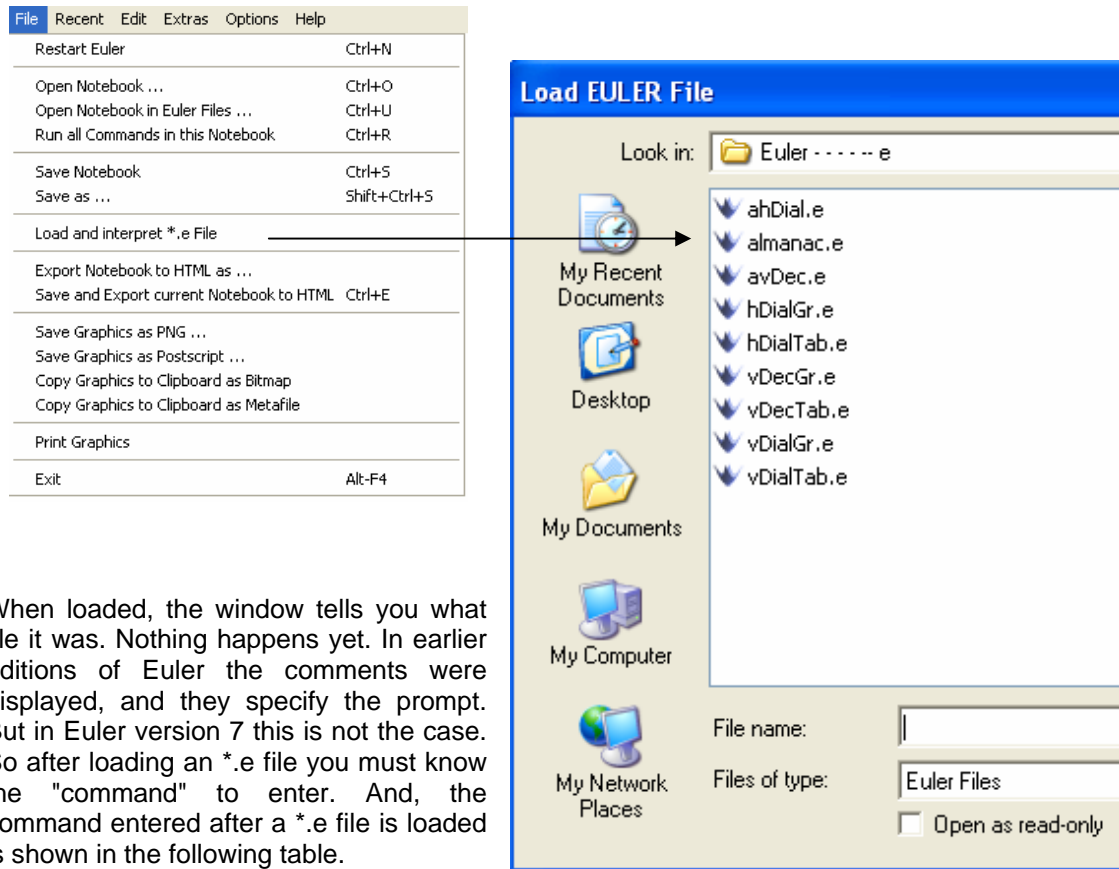
A program is saved in text form as xxxxxx.e and can be edited with something as simple as Wordpad. When saved, it is loaded as shown above. Euler has two panels it displays, one is for text, the other is for graphics.

NOTE: Tested on Windows XP SP1 and SP2 with Euler version 4

NOTE: Tested on Windows XP Euler version 7 and notes added on how to display comments, and animation improved dramatically.

RUNNING EULER PROGRAMS FIRST METHOD (or see next page)

First bring up Euler which has two windows. In the window which does not say GRAPHICS click FILE then LOAN AND INTERPRET *.e FILE



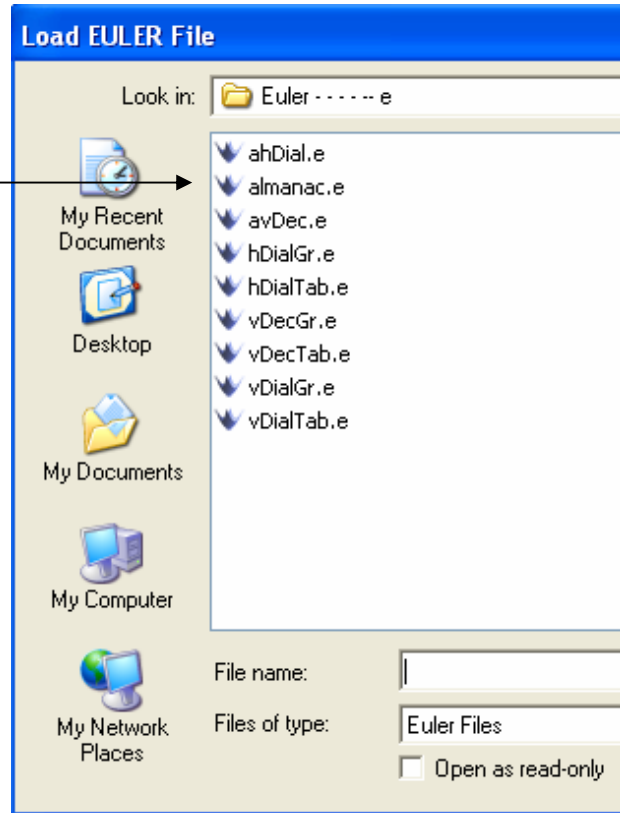
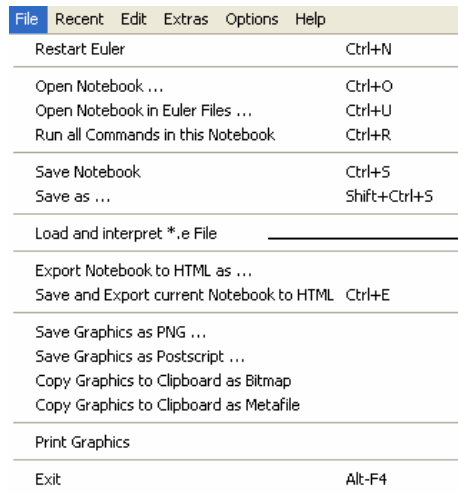
When loaded, the window tells you what file it was. Nothing happens yet. In earlier editions of Euler the comments were displayed, and they specify the prompt. But in Euler version 7 this is not the case. So after loading an *.e file you must know the "command" to enter. And, the command entered after a *.e file is loaded is shown in the following table.

| EULER FILE | ACTUAL COMMAND | COMMAND entered may not be the same as *.e name | |
|------------|-------------------|--|---------------------------|
| ahdial.e | ahdial | it asks for data however animation does not work in this Euler version | |
| almanac.e | almanac | it asks for input | |
| avdec.e | avdec | it asks for data however animation does not work in this Euler version | |
| hDialGr.e | hdial (33,8,5) | i.e. lat,long,ref | (note: hdial not hdialgr) |
| hdialtab.e | hdial (33,8,5) | i.e. lat,long,ref | (note: hdial not hdialgr) |
| vdecgr.e | vdec(33,8,5,-45) | i.e. lat,long,ref,decl | (note: vdec not vdecgr) |
| vdectab.e | vdec(33,8,5,-45) | i.e. lat,long,ref,decl | (note: vdec not vdectab) |
| vdialgr.e | vdial (33,8,5) | i.e. lat,long,ref | (note: vdial not vdialgr) |
| vdialtab.e | hdial (33,8,5) | i.e. lat,long,ref | (note: vdial not vdialgr) |

NOTE: The command entered after loading **vDialGr.e** is vdial (lat,lng,ref) and not vdialgr(lat,lng,ref).

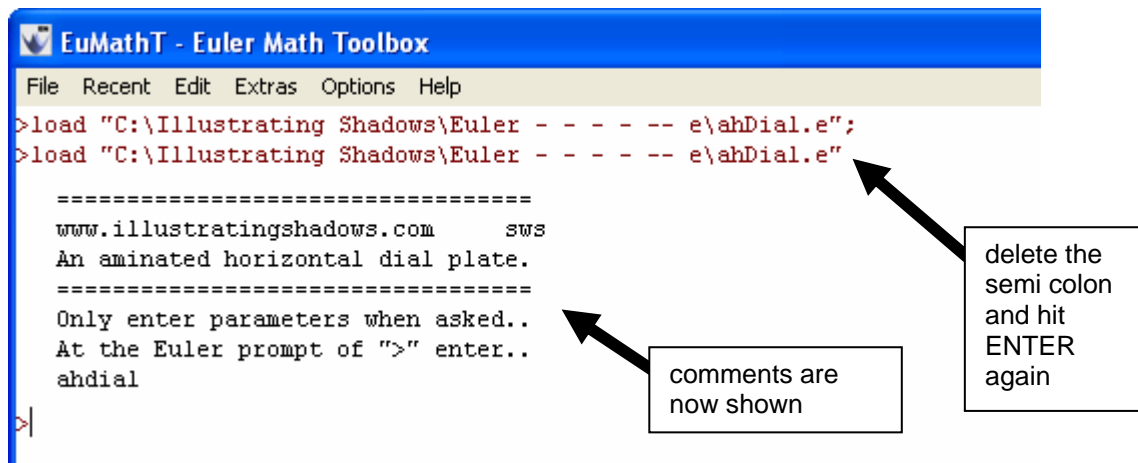
RUNNING EULER PROGRAMS SECOND METHOD

First bring up Euler which has two windows. In the window which does not say GRAPHICS click FILE then LOAD AND INTERPRET *.e FILE



When loaded, the window tells you what file it was. Nothing happens yet. In earlier editions of Euler the comments were displayed, and they specify the prompt.

But in Euler version 7 this is not the case. So after loading an *.e file you must know the "command" to enter, or, try this trick... After the LOAD, move the mouse to the ";" and delete it and hit ENTER again, now the comments are displayed.



NOTE: The command entered after loading **vDialGr.e** is **vdial** (lat,lng,ref) and not **vdialgr**(lat,lng,ref), etc. In other words, READ THE COMMENTS !!!

NOTE: Animation works better in version 7 of Euler.

Here is the Euler program for the h-dial.

TEXT/TABULAR VERSION

```
comment
=====
hDialTab.e
    hdial (lat, long, ref)
eg:  hdial (32.75, 108.2, 105)
=====
www.illustratingshadows.com 2008
=====
endcomment

function hdial(lat, long, ref)
.. calculate common data
slat=sin(lat*2*3.1416/360);
corm = (long-ref)*4;
corh = corm/60;
dlong = long-ref;
printf ("Correction in minutes: %4.1f", corm)
ii = 0;

##  loop for table of hour line angles
for i = 6 to 18;
    hr = i-corh;
    tanlha = tan(hr*15*2*3.1416/360);
    hla=round(360*atan(slat*tanlha)/(2*3.1416),2);
    printf ("Hour: %2.0f", i)
    printf ("      Hour line angle: %4.1f", hla)
    ii = i;
end
printf ("End of tabular data: Lat:   %4.1f", lat)
printf ("End of tabular data: Dlong: %4.1f", dlong)
return 0;

endfunction
```

Here is the Euler program for the v-dial.

TEXT/TABULAR VERSION

```
comment
=====
vDialTab.e
    vdial (lat, long, ref)
eg:  vdial (32.75, 108.2, 105)
=====
www.illustratingshadows.com 2008
=====
endcomment

function vdial(lat, long, ref)
.. calculate common data
clat=cos(lat*2*3.1416/360);
corm = (long-ref)*4;
corh = corm/60;
dlong = ref-long;
printf ("Correction in minutes: %4.1f", corm)

##  loop for table of hour line angles
for i = 6 to 18;
    hr = i-corh;
    tanlha = tan(hr*15*2*3.1416/360);
    hla=round(360*atan(clat*tanlha)/(2*3.1416),2);
    printf ("Hour: %2.0f", i)
    printf ("      Hour line angle: %4.1f", hla)
end
printf ("End of tabular data: Lat:   %4.1f", lat)
printf ("End of tabular data: Dlong: %4.1f", dlong)
return 0;

endfunction
```

A text/tabular version exists for the vertical decliner also.

GRAPHICAL VERSIONS OF DIAL CODE

```

comment
=====
hDialGr.e Jan 14, 2008 1731 mst
      hdial (lat, long, ref)
eg: hdial (32.75, 108.2, 105)
=====
www.illustratingshadows.com sws
=====
endcomment

function hdial(lat, long, ref)
.. calculate common data
slat=sin(lat*2*3.1416/360);
corm = (long-ref)*4;
corh = corm/60;
dlong = long-ref;
printf ("Correction in minutes: %4.1f", corm)
.. note: ";" after instr stops echoing
.. sin(lat)
.. correction in minutes
.. correction in hours
.. difference in longitudes
.. state correction in minutes

## define dial center (xc, yc) and the left, right, down values
## 0,0 is top left in Euler
xc=0;
yc=0;
..
bottom
xys=1;
arscale = 0.8 ;
.. keepsquare(1)
window
hold on;
title("Horizontal Dial");
.. x and y for
.. dial center
.. plots smallest x left, smallest y
.. x and y size
.. aspect ratio scaling of (whatever)
.. force Euler to use square coordinate
.. stops PLOT(x,y) refreshing
.. graph's title

## loop for table of hour line angles
for i = 6 to 18;
..
.....
hr = i-corh;
tanlha = tan(hr*15*2*3.1416/360);
..
thla = slat*tanlha;
hlaR=atan(thla);
hlaD=round(360*hlaR/(2*3.1416),2);
printf ("Hour: %2.0f", i)
printf (" Hour line angle: %4.1f", hlaD)
.. tan of Local Hour Angle
.. dont confuse suns LHA with dials HLA
.. tan of Hour Line Angle
.. hour line angle = sin(lat)*tan(lha)
.. hour line angle in degrees

## get vector for this line
y = [ xc, xys ];
x = [ yc, arscale*xys*thla ];
plot ( x,y );
if i==9 then label( "9", arscale*xys*thla, xys ); endif;
if i==12 then label( "noon", arscale*xys*thla, xys ); endif;
if i==15 then label( "3", arscale*xys*thla, xys ); endif;
..
.....
end
printf ("End of tabular data: Lat: %4.1f", lat)
printf ("End of tabular data: Dlong: %4.1f", dlong)
printf ("Must verify aspect ratio: %4.1f", arscale)
label( "MUST verify aspect ratio.", xc,yc);
.. show the latitude
.. and diff long
.. advise aspecr ratio issues

## get vector for a 45 degree line the user can use for aspect ratio determination
y = [ xc, 0.5*xys ];
x = [ yc, 0.5*arscale*xys*tan(2*3.1416*45/360) ];
label( "<45>", 0.5*arscale*xys*tan(2*3.1416*45/360), 0.5*xys );
plot ( x,y );
.. do a 45 degree line
.. to let user test for aspect ratio

## that is all
..insimg;
return 0;
.. show image in text area

endfunction

```

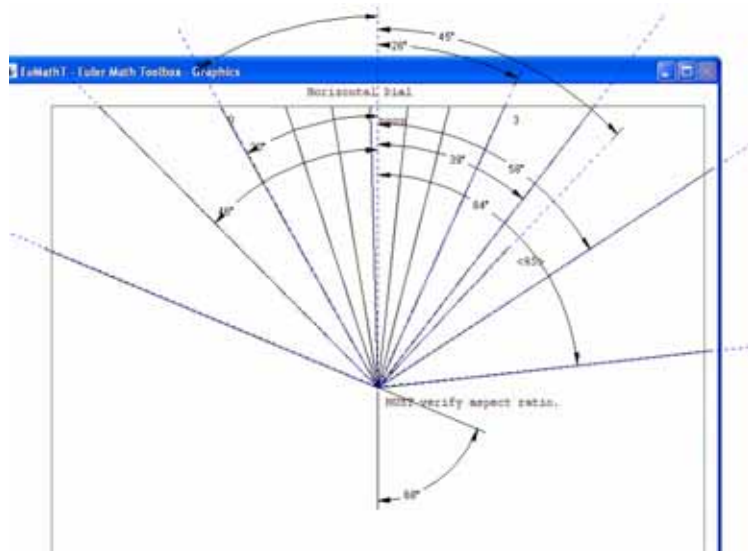
Animated versions of the graphical dials also exit.

The program runs and displays hour angles:-

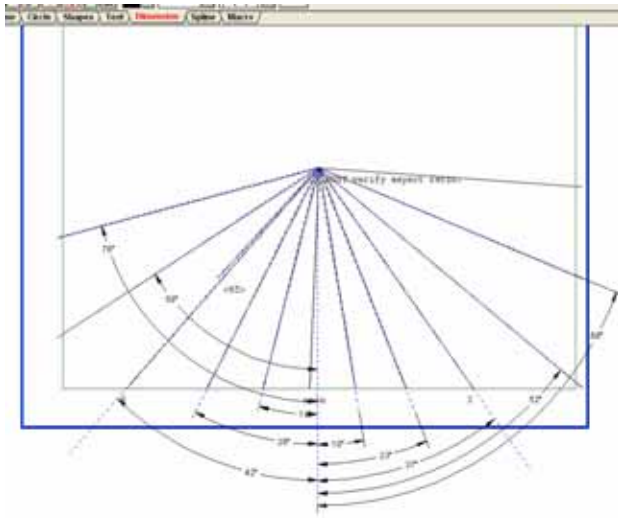
```
>load "C:\Illustrating Shadows\Euler - - - -- e\hDialGr.e";
=====
hDialGr.e Jan 14, 2008 1731 mst
      hdial (lat, long, ref)
eg:  hdial (32.75, 108.2, 105)
=====
www.illustratingshadows.com sws
=====
>hdial (32.75, 108.2, 105)
Correction in minutes: 12.8
Hour:  6
      Hour line angle: 84.1
Hour:  7
      Hour line angle: -68.9
Hour:  8
      Hour line angle: -47.0
Hour:  9
      Hour line angle: -31.2
Hour: 10
      Hour line angle: -19.5
Hour: 11
      Hour line angle: -10.1
Hour: 12
      Hour line angle: -1.7
Hour: 13
      Hour line angle:  6.5
Hour: 14
      Hour line angle: 15.3
Hour: 15
      Hour line angle: 25.8
Hour: 16
      Hour line angle: 39.6
Hour: 17
      Hour line angle: 58.7
Hour: 18
      Hour line angle: 84.1
End of tabular data: Lat:  32.8
End of tabular data: Dlong:  3.2
Must verify aspect ratio:  0.8
```

And the graphical depiction is:-

The angles verified by using DeltaCAD, the aspect ratio line of 45 degrees was checked, and used to help adjust the programs scaling factor.



The vertical dial produces similar depictions. The angles being validated.



The vertical decliner also.

