Version

2.2

EMERING OY

Solutions by Study

Emering Animator User Manual

USER MANUAL

Emering Animator

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Chapter

1

Introduction

What it is and what it can?

Emering Animator software allows to animate data related to 3D structural models. These data can be displacements, operating deflection shapes, vibration mode shapes and other. Data for animations can be obtained by measuring structures, or by modeling structural behavior using finite elements. Emering Animator uses OpenGL graphic library. Version 2.1 of the Emering Animator is able to display 1D point elements and 2D line and roll elements.

Chapter

2

Installation

What you need? How to install? How to uninstall?

System Requirements

System requirements for Emering Animator are :

- Windows 98, NT, ME, 2000 or XP.
- About 7Mb of free space on the hard disk.
- A pointing device (mouse).

Setup Procedure

There are 2 ways to install Emering Animator : either by using a special setup program which automatically installs the software on your computer (automatic setup), or via manual installation by copying all necessary files into chosen directory (manual setup).

1. Automatic setup is easier, but zip-file to be download is a bit larger than for manual setup. Installation steps for automatic setup

   1.1 Download file `EmeringAnimatorSetup.zip` from the downloads page at http://www.emering.fi.

   1.2 Extract contents of `EmeringAnimatorSetup.zip` i.e. setup files, to a temporary directory (c:\temp, for example). Setup files contained in zip-archive `EmeringAnimatorSetup.zip`, are :

1.3 Run `Setup.exe` and follow installation instructions. Setup program automatically installs all necessary files and creates program icons.

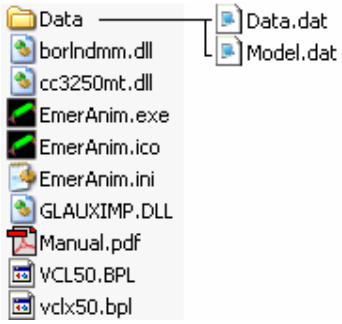
1.4 Delete setup files from temporary directory.

1.5 Run Emering Animator by clicking on Emering Animator icon, created by setup software.

2. Manual setup goes according to the 3 steps listed below :

2.1 Download file `EmeringAnimatorFiles.zip` from the downloads page at http://www.emering.fi.

2.2 Extract contents of `EmeringAnimatorFiles.zip` i.e. Emering Animator's program files, to a directory where you wish to install the software (c:\Program Files\EmeringAnimator, for example). Program files and a subdirectory , contained in zip-archive `EmeringAnimatorFiles.zip` are shown below. Note that subdirectory \Data contains 2 sample files : `Data.dat` and `Model.dat`.



2.3 Run Emering Animator by double-clicking on `EmerAnim.exe`. Optionally you can add Desktop shortcuts to the software.

Un-installation Procedure

Depending on how did you install Emering Animator, there are 2 ways to uninstall the software :

1. Automatic un-installation. Use this procedure if you automatically installed Emering Animator :

1.1 Click on Start Menu -> Control Panel -> Add/Remove Programs.

1.2 Select Emering Animator and click Remove. Emering Animator will then be removed from your computer.

2. Manual un-installation. Use this procedure if you installed Emering Animator manually :

2.1 Delete all files and subdirectories you have created during manual installation. Note that Emering Animator does not copy files to Windows system directory, neither it adds or changes Windows registry entries.

Chapter

3

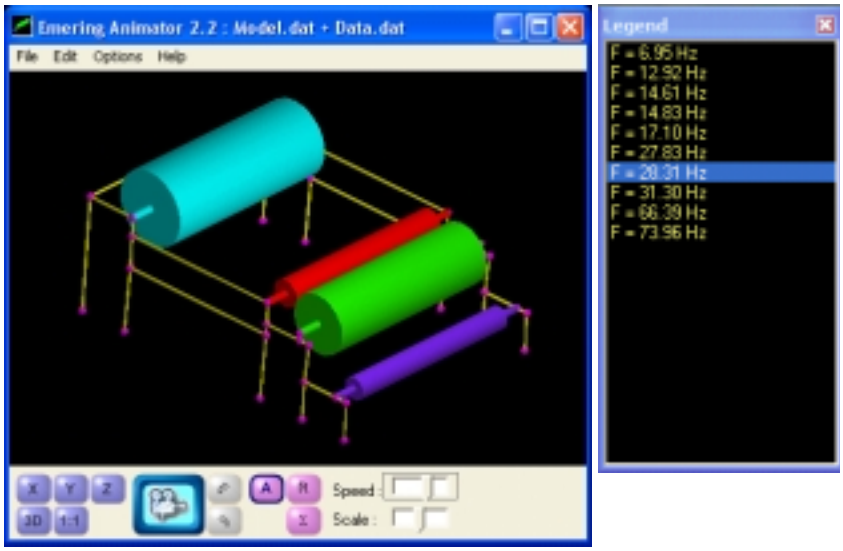
Quick Start

Basic steps to visualize your 3D model.

Run Emering Animator

If you have installed the software (for installation information see previous chapter), then click on Emering Animator's icon, or execute file `EmerAnim.exe`.

Two windows will appear : larger window is the Model Window and the smaller window is the Legend Window (see figure below). The Model Window displays 3D model of the structure to be animated. It also allows to scale and to rotate the model, as well as to change animation speed. The Legend Window allows to select between data sets loaded.



Load Your Model

When you first execute Emering Animator, then a demo-model is automatically loaded and visualized (demo model can be found in file ..\Data\Model.dat). To load your own model :

1. Unload current model by choosing the Clear Model command from the File menu. Current model and related data disappears.

2. Load your model by choosing the Load Model command from the File Menu.

3. Select model file from the File Open Dialog and click Open. Note that model files have a specific format (see chapter File Formats for more information) By default a model from file `..\Data\Model.dat` is displayed.

4. Verify that the Show Model menu command in the Options Menu is checked. Check it if it is unchecked, otherwise the model will not appear on the screen.

Now, if file format of your model is correct, then you should see the 3D image of the model chosen. You can rotate and scale the model by holding down the left and the right mouse buttons, correspondingly. See chapter Commands and Buttons for a complete reference about how to manipulate the model.

Load Your Data

When you first execute Emering Animator, then a demo-demo data is automatically loaded with the demo model (demo data can be found from file `..\Data\Data.dat`). To load data other than the demo-data :

1. Unload current data by choosing the Clear Data command from the File menu. Data, related to a current model disappears.

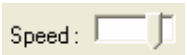
2. Load your data by choosing the Load Data command from the File Menu.

3. Select data file from the File Open Dialog and click Open. Note that data files, as model files, have a specific format (see chapter File Formats for details) By default data from file `..\Data\Data.dat` is displayed.

If data format loaded is correct, then you should see a list of data sets appear in the Legend Window. Select a data set to be animated by clicking on appropriate item in the Data Sets List.

Animate data by clicking the Animate Button . You can rotate and scale the model during animation. To stop the animation click on the Animate Button again.

To increase or to decrease the scale of the data, move the Scale Slider right or left.



To increase or decrease the speed of animation, move the Speed Slider.

Quit Emering Animator

To exit Emering Animator, choose the Exit Command from the File Menu, or click the Close Button  of the Model Window.

Chapter

4

Commands & Buttons

All about menu, mouse and button commands.

Menus

File

Load Model…	Loads Emering Animator's model files. Model files are ASCII text files having a specific format (see chapter File Formats). **This function is disabled in demo version**
Load Data…	Loads Emering Animator's data files. Data files are ASCII text files having a specific format (see chapter File Formats). **This function is disabled in demo version**
Clear Model	Unloads current model and data related to it. **This function is disabled in demo version**
Clear Data	Unloads data related to the current model. **This function is disabled in demo version**
Save As Bitmap…	Converts current view of the model into Windows bitmap format and saves the picture into a file.
Exit	Quits the application

Edit

Copy	Copies image on the clipboard. Shortcut key for the Copy command is Ctrl+C.

Options

Colors ▶	Prompts the Color Setup Dialog. Choose a color and click OK to change color of an item. Items are listed below.

Font…	Font color of the Legend Window
Background…	Background color of the Model and Legend Windows
Elements…	Color of elements whose color ID in the model file is -1
Nodes…	Color of all nodes
Node Shapes ▶	Allows to change shape of nodes. Possible shapes are listed below
Sphere	Nodes are drawn as spheres 
Cube	Nodes are drawn as cubes 
Show Model	Check or uncheck this menu to display or hide the model
Show Legend	Check or uncheck this menu to display or hide the Legend Window
Save options on Exit	Check this menu if you wish that all current settings are saved after the application quits. If unchecked, then settings are not stored. Note that all settings are stored in text file `EmerAnim.ini`. You can change settings also by editing the ini-file.

Help

About…	Shows the About Window.

Mouse

Left MB	To rotate the viewport (MB=Mouse Button)
Right MB **Ctrl+Left MB**	To scale (to zoom) the viewport
Middle MB **Shift+Left MB**	To pan the viewport

Buttons & Sliders

View

	Displays Y-Z plane

Displays X-Z plane

Displays X-Y plane

Displays default 3D view

Scales whole model into the window

Animation

The Animate Button switches animation mode of the model On/Off

Displays one animation step backwards (the Animate Button must be switched Off)

Displays one animation step forward (the Animate Button must be switched Off)

Changes the animation speed. Note that the actual speed depends on capabilities of your computer.

Scaling the Data

Absolute scaling – scale factor is computed using magnitudes of **all loaded** data sets. This scaling mode allows to compare magnitudes of different data sets

Relative scaling – scale factor is computed using magnitudes of a **selected** data set. This scaling mode allows to compare magnitudes of different data sets

Summed display – selected data sets are summed and displayed as one data set. Note that to select multiple data sets, hold down the *Ctrl* key when selecting data sets by a mouse.

Changes magnitude of the scale factor.

Chapter

5

File Formats

How to create model? How to organize related data?

In order to enable Emering Animator to load and visualize 3D models and related data, the model and data must be ordered according to a specific format. Data describing a model is given in ASCII text files called Model Files. Data, describing the model behavior, is given in ASCII text files called Data Files.

Model Files

Model properties such as node coordinates and element topography have to be written in Model File according to a specific format : The Model File contains 3 sections : options, nodes and element sections :

[Options]
NodeRadius=r_{node}
ElementRadius=$r_{element}$

[Nodes]
NodeID CoordinateX CoordinateY CoordinateZ
. . . . .

[Elements]
CountOfElements
ElementID Element type-dependent data (see table below)
. . . . .

Element Type	Data / Description
Line elements	1 $r_{element}$ *ColorID* 2 ID_{node1} ID_{node2} 1 — type identifier for line elements $r_{element}$ — element radius. If $r_{element}$ =0 , then element is drawn as a rectangular bars, otherwise the element is drawn as a cylinder. *ColorID* — element color ID_{node1} — identifier of the first node ID_{node2} — identifier of the second node

Roll elements	2 r_{roll} r_{axle} $2L_{axle}/L_{roll}$ *ColorID* 2 ID_{node1} ID_{node2} 2 — type identifier for roll elements r_{roll} — roll radius r_{axle} — axle radius $2L_{axle}/L_{roll}$ — ratio of 2 axle lengths to the roll length. If this ratio is 0 then element is drawn as a cylinder. Maximum value of the ratio is 1.0. *ColorID* — element color ID_{node1} — identifier of the first node ID_{node2} — identifier of the second node
Planar elements	3 *ColorID NodeCount* ID_{node1} ID_{node2} . . . ID_{nodeN} 3 — type identifier for planar elements *ColorID* — element color ID_{node1} — identifier of the first node ID_{node2} — identifier of the second node ID_{nodeN} — identifier of the last node
Node elements	15 $r_{element}$ *ColorID* 1 ID_{node} 15 — type identifier for node elements $r_{element}$ — element radius *ColorID* — element color ID_{nodeN} — identifier of the node

For example :

```
[Nodes]
1    0.00    0.00    0.00
2    0.00    3.20    0.00
3    1.40    3.20    0.00
4    1.40    0.00    0.00
5    1.40    2.70    0.00
6    5.90    2.70    0.00
 [Elements]
5
1 1 0 -1 2 1 2
2 1 0 -1 2 3 4
3 1 0 -1 2 4 5
4 15 0 255 1 6
5 1 0.52 16500 2 2 3
```

Elements 1, 2 3 and 5 in example, are line elements of type 1, having 2 nodes each, and element 4 is a point element of type 15, having one node. Note that section names ([Nodes] and [Elements]), are case sensitive i.e. if section is named for example [eleMeNts], then elements of the model will not be loaded. If *ElementColor* of an element is set to -1 then software displays this element by a default element color. If *ElementRadius* is greater than 0 (element 5 in our example),

then elements are drawn as rolls, otherwise elements are drawn as rectangular tubes having a diameter equal to a variable `ElementRadius`, defined in section [Options].

Data Files

Data File contains arbitrary count of sections, where each section represents a data set. Section names i.e. the data set names which appear in the Legend Window, should be placed inside parentheses (for example section [F=6.75Hz] appears as a list item F=6.75Hz in the Legend Window). Data in every section should be formatted as follows :

[Section Name for Complex Data]
NodeID MagnitudeX MagnitudeY MagnitudeZ PhaseAngleX PhaseAngleY PhaseAngleZ
. . . . .

For example :

1 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00

2 2.10000E-02 0.00000E+00 -6.07000E-01 0.00000E+00 0.00000E+00 0.00000E+00

3 2.00000E-02 -1.00000E-03 6.98000E-01 0.00000E+00 0.00000E+00 0.00000E+00

4 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00

5 1.40000E-02 -1.00000E-03 6.34000E-01 0.00000E+00 0.00000E+00 0.00000E+00

6 9.00000E-03 0.00000E+00 -1.40000E-02 0.00000E+00 0.00000E+00 0.00000E+00

NodeIDs should correspond to the NodeIDs in the model file. If data for particular node is missing, then it is considered to be 0 (i.e. representing non-moving node). Order of nodes can be arbitrary. Phase angles of complex data should be in radians.

Chapter

6

Version Info & Bug Fixes

How it grows? What have been the problems?

Version 2.2

02.11.2003

- 2 new element types (rolls and planar elements) added.
- Changes in format of the model file : section [Options] added.
- Copy command added to the Edit Menu.

Version 2.1

06.10.2003

- Old Windows98-style buttons have been replaced by “smooth” buttons.
- Tested under Windows 98 and XP.
- New User Manual.
-

Version 2.0

29.09.2003

- Smooth rendering of the model (with lighting).
- Line elements with defined radius are drawn as rolls.
- Tested under Windows XP.
- Hangs up under Windows 98. This bug is fixed in Version 2.1