EESy Solutions

Engineering Equation Solver Newsletter ***No. 10, Fall, 2000***

Welcome

EESy Solutions is a newsletter developed to provide news, tips, and tricks relating to Engineering Equation Solver. **EESy Solutions** is provided at no cost to all registered users of EES.

Visit our Internet Site

F-Chart Software's website (www.fchart.com) has been completely revised to allow faster access, more information, and on-line ordering. The website provides a number of free downloads including demonstration copies of EES and FEHT (our finite-element analysis program), a revised manual in Adobe Acrobat format, a list of new features, new example problems, support routines (such as the operating system patch provided by Microsoft to fix the missing icons problem on the toolbar), and external programs that extend the capabilities of EES. One of the external programs that may be of interest is the Chem_Equil library routine that calculates the equilibrium composition of 14 species for a mixture of gases containing elements C, H, O, N, and Ar at a specified temperature. An EES distributable program called Adiabatic Combustion is provided in the Examples page to calculate the temperature and species concentrations for adiabatic combustion of a specified fuel with a specified air-fuel ratio.

WCB/McGraw-Hill Academic License

New academic versions of EES are now exclusively distributed by WCB/McGraw-Hill. Academic versions of EES are provided at no cost to educational departments that adopt selected WCB/McGraw-Hill textbooks including: *Thermodynamics: An Engineering Approach* 3rd edition by Cengel and Boles; *Heat Transfer: A Practical Approach* by Cengel; *Thermodynamics* 6th edition by Wark and Richards, and *Fluid Mechanics* 4th edition by White. Educational site licenses can also be obtained from WCB/ McGraw-Hill independent of any textbook adoption. F-Chart Software distributes the commercial and professional versions of EES and provides technical support for all versions.

What's Coming

EES is continuously being updated to add new features and eliminate bugs. Our next scheduled update will be in Spring of 2001. An update notice will be sent to each registered owner. If your address has changed or you wish to check to see if you are registered, send a FAX or e-mail to f-Chart software with your address, e-mail, and registration number. Here's a summary of some of the features that you can expect to find in the next update to version 6.

Multiple Parametric and Lookup Tables

Did you ever wish you could set up two or more Parametric tables or access more than a single Lookup Table?. These limitations have removed in version 6. Now, any number of Parametric and Lookup tables can be defined. Tabs are provided on the Parametric and Lookup windows (and on the Integral table window as well) to simplify access to the tables. The **Solve Table** command can do the calculations for a specified Parametric table or for *all* Parametric tables. Functions that access the Lookup tables (e.g., Lookup, Interpolate, Differentiate) are now designed to accept the name of the Lookup table that appears on the tab. Plots can be generated from any table. All tables are stored in the .EES file with the Save command. These changes greatly extend the capabilities of EES.

Unlimited Plot Windows

Version 6 eliminates the limit of 10 plot windows that existed in previous versions. Now, the number of plots is limited only by available memory. Plot management has been simplified by the use of tabs in the Plot window. The tabs can be given names for easy identification. The plot routines can be generated from data in any Parametric, Lookup, Integral, or Array table.

Improved Table Access

All of the EES tables have been redesigned to simplify changes in properties and copy-paste operations. For example, clicking the left mouse button in the column or row header selects that column or row. Right-clicking anywhere on the table brings up a pop-up menu listing all options. Selected cells in a table can now be printed.

Plot Window Enhancements

In addition to removing the limitation of 10 plot windows, a number of other enhancements have been added to the plots in version 6 including:

i) Two X-axis scales can be defined. The second X-axis scale is initially placed at the top of the plot, but it can be moved to any location using the Ctrl-up/down arrow keys.
ii) Left and right Y-axis scales have always been supported in EES. However, now the scale choice has been simplified and the scale choice can be changed after the plot is constructed. The right Y-axis scale can be moved with the Ctrl-left/right arrow keys.
iii) Text placed on the plot window can contain the name, value, and units of any EES variable. The value can optionally be updated on the plot when it changed in your program.
iv) A new algorithm has been devised to automatically select the interval used on the X and Y-axis scales. The new algorithm provides better looking plots.

Did You Know?

Many users wish to copy plots from EES to MS Word or other applications. When EES copies a plot to the Clipboard, it provides it as both a picture and a bitmap. Using the Paste command in Word will paste the picture form of the plot. The picture form requires the least memory, but it is constructed at screen resolution (96 pixels per inch) rather than at your printer resolution. The bitmap form of the plot will generally produce a better looking image when printed. To copy the bitmap, use the Paste Special command in Word and select Device Independent Bitmap.

We receive a number of complaints that EES does not copy plots in color. A control to copy plots in color is provided on the Plot tab of the Preferences dialog (Options menu). As shipped, the Copy in Color checkbox is not selected. If you wish to have your plots copied in color, check this control and store the changes. Note that color bitmaps require much more memory than black and white bitmaps. If you are copying bitmap plots to other applications in color, you may also wish to change the bitmap resolution.

An EES file with spaces in the file name may not properly start when double-clicking on the file name. A simple fix is to use underscores instead of spaces in the file name. Alternatively, you can repair this problem by reconfiguring your registry entry for EES as follows. In WINDOWS, go to the Folder Options command in the View menu. Select the File types tab and scroll until you find EES Document. Click on it and the click the Edit button. Select the Open item and click the Edit button. Ensure that the field under the words "Application used to perform action" is:

```
c:\ees32\ees.exe "%1"
```

(The above line assumes that EES is installed c:\ees32. If not enter the appropriate directory.) Make any necessary edit changes, click OK, Close, Close, and your problem should be cured.

Equations that are displayed in the Formatted Equations window can be copied to other applications, such as Power Point and Word as pictures. Click on the equation that you wish to copy. It will be displayed in reverse video. Then select the Copy command. Use the Paste command in the application. Once pasted, the equation can be resized and repositioned.

The Integral Table (first implemented in version 5.006) simplifies solutions of differential equations. In EES, a differential equation such as dy/dx=f(x,y) must be transformed into an integral equation in the form: $y = y_o + \int f(x,y)\,dx$. This equation may be entered into EES as:

```
y = y_o+integral(fxy,x,x_0,x_final)
```

where fxy can be any EES variable or expression, x is the integration variable, and x_o and x_final are the limits of integration. EES will solve the integral when calculations are done, but intermediate results showing y =y(x) will not be available unless you also provide an integral table directive. For example, if you enter

```
$IntegralTable x:0.1 y
```

EES will generate values of x and y at increments of 0.1 and place them in the Integral Table. These values can then be plotted or printed.