ADINA System Newsletter

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September 11, 2001 was a day that shocked people around the world. We feel deep sorrow for the families who have lost loved ones in this terrible tragedy.

ADINA System 7.5 Released

The ADINA System 7.5 was released in August 2001. To obtain an overview of the enhancements and new capabilities in ADINA 7.5, please refer to the ADINA System 7.5 Release Notes which are included in the ADINA 7.5 distribution CD in a pdf (Acrobat Reader) file.

In our previous newsletter, we have listed the supported platforms and minimum operating systems required to run ADINA 7.5. For the latest update on the system requirements, in particular relating to the IBM AIX operating system, please visit the Support page on our web site.

Increased Productivity

In the ADINA System 7.5, three key areas of improvements make the ADINA User Interface (AUI) a much more productive tool for our users.

1. **Faster graphics performance**
   The display speed for mesh plots is significantly improved. Comparison results were presented in the previous newsletter.

2. **Finding help**
   The HTML-based online help system provides an easier and faster way for users to find information on the use of the ADINA System.

3. **Easier execution of tasks**
   New icons provide quick access to commands which required many mouse clicks in previous versions. In addition, customizable toolbars, shortcut keys, and macro icons allow each user to create his/her most effective environment.

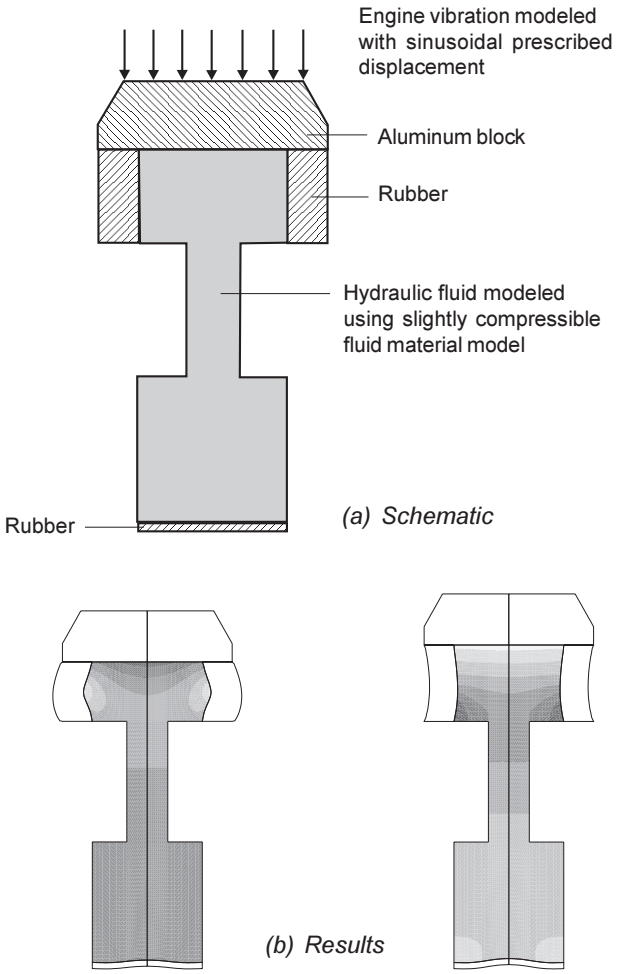


Figure 1: Analysis of Automotive Hydraulic Engine Mount

Training Classes

The next ADINA-AUI training course will be held at ADINA R & D on December 6-7, 2001.

Inside This Issue

We will, of course, continue to improve these important aspects of ADINA in our development efforts.

In the sections below, we highlight some of the tools available to help you work more effectively in ADINA 7.5.

AUI Initialization File

You can create an initialization file that will be read by the AUI each time a new database is created (i.e. when you start the AUI or when you click on the icon New).

The initialization file can be used to set up an AUI environment that is most suitable for your modeling needs, for example you can define your own styles for mesh plot, change program settings, etc. A simple example of an initialization file is shown below.

```
* set no heat transfer for ADINA-F
FEPROGRAM ADINA-F
MASTER IDOF=00001
* change default time function for ADINA
FEPROGRAM ADINA
TIMEFUNCTION 1
@clear
0 0
1000 1000
@
```

Figure 2: Example of AUI Initialization File (auienv.ini)

- The initialization file uses the same regular AUI commands as an AUI input (.in) file.
- The initialization file must be named “auienv.ini”.

The initialization file is searched in the following order:

- The current working directory.
- On Unix only, the user’s home directory.
- The ADINA home directory, i.e. where the ADINA System is installed.

Once a file named “auienv.ini” is found, the search will stop, i.e. only one initialization file will be used.

Macro Icons

Macros are input files containing AUI commands which are assigned to icons to perform certain tasks. The commands in a macro file are executed with a single mouse click on the associated macro icon. Essentially, any AUI command can be used in a macro file.

Some tasks a macro icon can be used for, include:

- Defining commonly used material models
- Creating certain environment preferences
- Specifying certain analysis parameters
- Defining resultant variables for use in post-processing

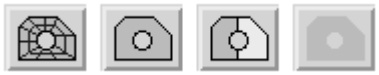
While an initialization file is used for settings that a user wants to use most of the time (if not all of the time), a macro is used for settings and definitions that the user uses only with some models.

Macros can be very effective for repetitive tasks that have to be performed within a model or for many models. The instructions on how to assign macros to icons are described in the AUI online help.

Highlights on Some New Icons

Among the many new icons available in ADINA 7.5, we want to highlight some of the icons which are particularly useful in increasing productivity.

In previous versions, it was tedious to step through the results for viewing in post-processing. The above group of icons now makes it extremely easy to examine the results step by step.



When viewing certain results (e.g. velocity vectors on 2-D flow models), the visual effect is usually better when the internal mesh lines are not displayed. In previous versions, this option is difficult to set and is often not obvious to a new user. Now,

the user can select to display all the mesh lines, the model outline, the group outline, or no mesh lines with a single mouse click.

By default, a mesh plot is displayed using factory settings, for example, 3-D models are shown in isoview 1 and entity labels are not shown. You may want to change the default setting to use a different view and to display the point labels. Again, this task which was tedious previously, can be easily performed in ADINA 7.5. After displaying the point labels (using Point Labels icon) and rotating to the desired view, a click on the Save Meshplot Style icon above will save this current depiction as the default. The Reset Meshplot Style icon will set the default style back to factory settings.

Quick plot icons allow the user to display certain results on the mesh plot with a single click. The Quick Bandplot icon displays the effective stress for an ADINA model, temperature for an ADINA-T model, or nodal pressure for an ADINA-F model. The Quick Vector Plot icon displays the principal stresses for an ADINA model, heat flux for an ADINA-T model, or velocity for an ADINA-F model.

Menu Shortcut Keys

Menu shortcut keys are only available on the PC Windows version.

Shortcut keys allow you to access any menu item by pressing a key or combination of keys on the keyboard. For example, to draw text on the graphics window, you can use the menu Display > Text > Draw... Alternatively, you can assign a shortcut key (e.g. Alt + T) to this menu item. Then, each time you need to access the menu item, you simply press the key combination Alt + T.

Note that the shortcut key strokes that you assign are automatically saved so that you can use the same key strokes when you use the AUI next time for the same model or a different model.

By using shortcut keys for commonly accessed menu items, you can reduce the time to prepare your model. Instructions on how to assign shortcut keys are described in the AUI online help.

Application Showcase

In this issue, we show the use of ADINA for the analysis of an automotive hydraulic engine mount involving fluid flows with structural interactions.

Hydraulic engine mounts are used to reduce automotive engine vibration and noise. The performance of the hydraulic engine mount due to variations in the excitation frequency and amplitude is of interest to the designer.

The schematic in Figure 1(a) shows the generic model used in our simulation. The engine excitation is modeled using a sinusoidal prescribed displacement acting on the aluminum block. Results at two solution time steps are shown in Figure 1(b).

Potential-Based Fluid Elements

An effective capability in ADINA is the potential-based fluid element with only one degree of freedom (the fluid potential) at each node.

The potential-based fluid element may be used instead of the ADINA-F full Navier-Stokes fluid element to achieve a much more efficient solution when the following assumptions are valid for the fluid domain.

- Fluid is inviscid (i.e. no viscous effects)
- Fluid is slightly compressible
- Fluid motion is irrotational
- No heat transfer involved
- Small displacements and velocities in the fluid (i.e. no actual fluid flow)
- Small motions of the fluid boundaries

The potential-based fluid element can be used with structural elements to perform fluid-structure interaction analyses. It can also be used with the ADINA-F Navier-Stokes fluid element, where the region in which viscous effects are important is

modeled with ADINA-F elements and the rest of the fluid domain is modeled with potential-based fluid elements. See primer problem 15.

Although the potential-based fluid element has been in the program for many years, there has been increased interest recently. We are now working towards further improvements for this element.

Special 900 Nodes Version

We continue to receive good response for our offer of the special 900 nodes version. This special version is available for as little as US$120. It does not require any password and you can install it on as many PCs as you like. Please see our web site for ordering details.

Owners of the 900 nodes version can contact us to request the free upgrade to the 900 nodes version of ADINA 7.5. Many new features (including those mentioned in this newsletter) in ADINA 7.5 will make your modeling tasks much easier.

New Animations

We have recently added new animations which illustrate some of the powerful metal forming capabilities in ADINA.

- **Hemming**
  A well-known process used, for example in the automotive industry, for joining inner and outer door panels. This 2-D example can be solved with the 900 nodes version.

- **Stamping with springback**
  Simulation of the standard S-rail benchmark problem used for testing finite element simulation codes in stamping operations.

- **Deep drawing**
  A technology used in a wide range of production processes, for example, car parts in the automotive industry and household items such as stainless steel sinks.

- **Rolling**
  Different simulations of rolling are shown - multi-pass rolling, 3-D rolling of a thick metal plate, and rolling on a cluster mill.

All animations are included in the ADINA 7.5 PC Windows full version and 900 nodes version CD. They are also available on a separate animation CD that you can request.

Second M.I.T. Conference on Computational Fluid and Solid Mechanics, June 17 - 20, 2003

Please mark your calendars for the above Conference which will be held in the same spirit as the First Conference on the M.I.T. campus.

The mission of the M.I.T. Conference:
"To bring together Industry and Academia, and
To nurture the next generation in computational mechanics."

You can find more information on the Conference at http://www.secondmitconference.org.

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