

ADINA System Newsletter

Volume 5, Issue 2

www.adina.com

December 2002

Once again, it is the end of another year. First, we wish you and your families peace this Holiday Season and a bright New Year ahead.

Universal Solver

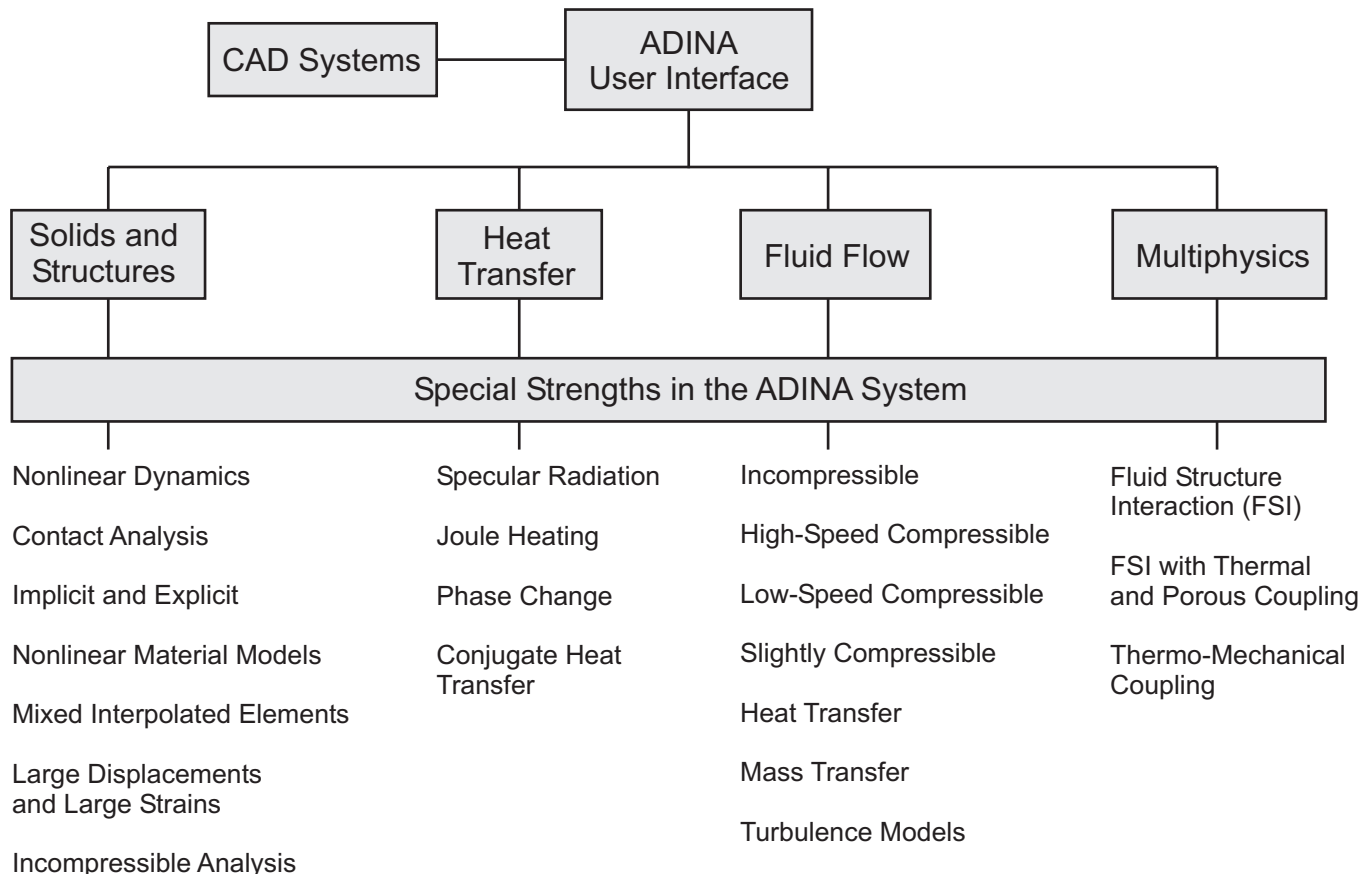
It was about ten years ago that we started the work on the ADINA System with the vision to develop a **universal solver** based on a common graphical user interface (GUI) for all types of analysis. We are very proud that with the release of the ADINA System 8.0, much has been accomplished towards this vision.

The ADINA System 8.0 marks a major milestone in our development efforts of the last decade. Besides many new capabilities added in ADINA 8.0,

the GUI for the Unix/Linux platforms has been completely redesigned to give the same look and feel as the PC Windows interface.

The ADINA System now has a very wide range of analysis capabilities. It is used in many industries to solve problems ranging from linear statics to nonlinear dynamics to fluid flows to multiphysics.

A particular strength of the ADINA System is that you can use one program system to solve different categories of problems in your company instead of using many different programs. This is the philosophy we have pursued in our developments. In this Newsletter, we present a guide to the capabilities of ADINA through a visual overview of the ADINA System.

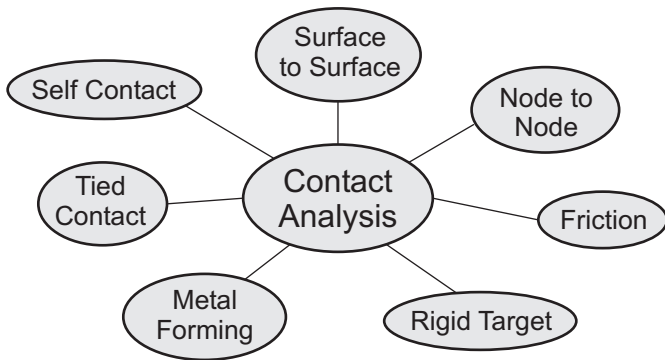


Let us highlight some of the special strengths in the ADINA System.

Contact Analysis

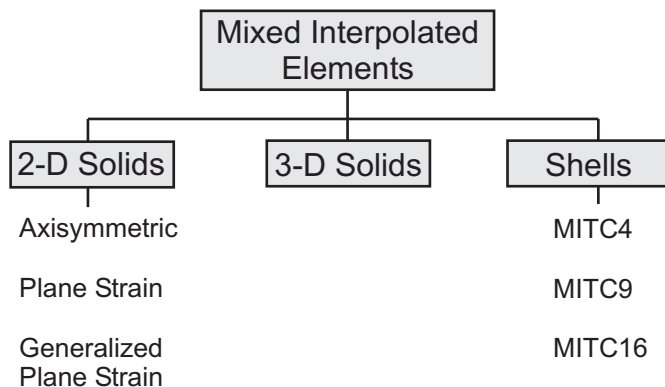
The robust and accurate contact analysis capability has been a very important strength in ADINA for many years. It is one of the key features why users choose ADINA over other programs.

In recent years, we have extended this capability for the analysis of sheet metal forming. We are confident that ADINA can solve many sheet metal forming problems in industries more efficiently than other programs. We welcome you to give us your problem to benchmark against other programs.



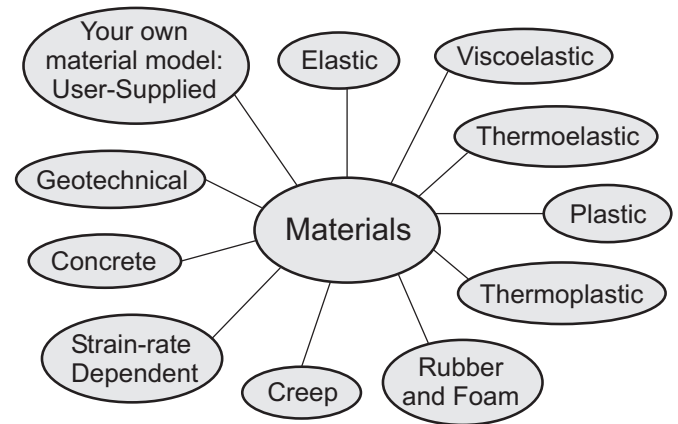
Mixed Interpolated Elements

For the analysis of incompressible media and the analysis of shell structures, we strongly recommend that mixed interpolated elements (instead of pure displacement-based elements) be used to obtain accurate solutions. ADINA provides effective elements for such types of analyses.



Structural Material Models

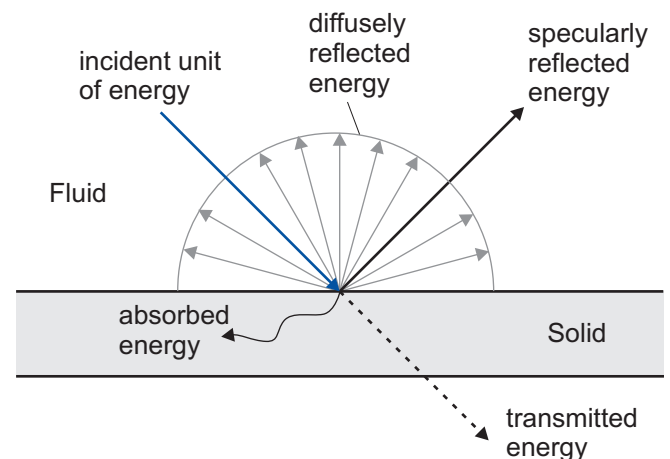
A very large selection of material models is available in ADINA. In the diagram shown below, each material category typically represents various material models. For example, under rubber and foam materials, the Mooney-Rivlin, Ogden, Arruda-Boyce, and hyperfoam models are available.



Specular Radiation

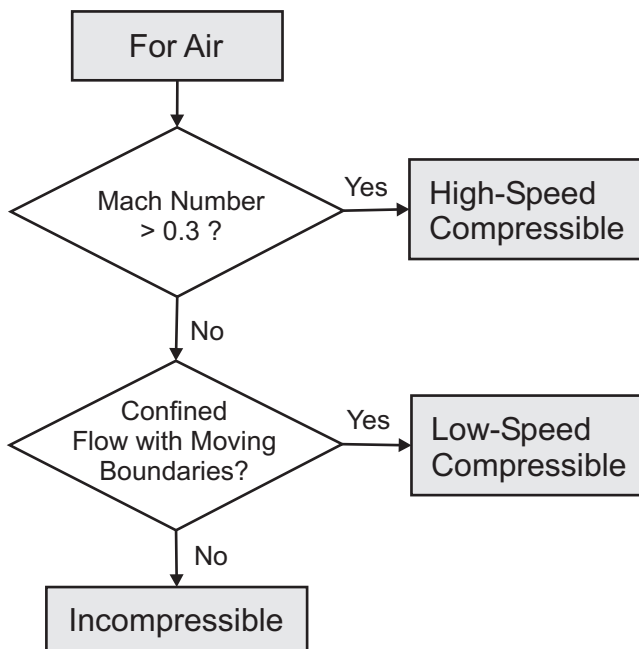
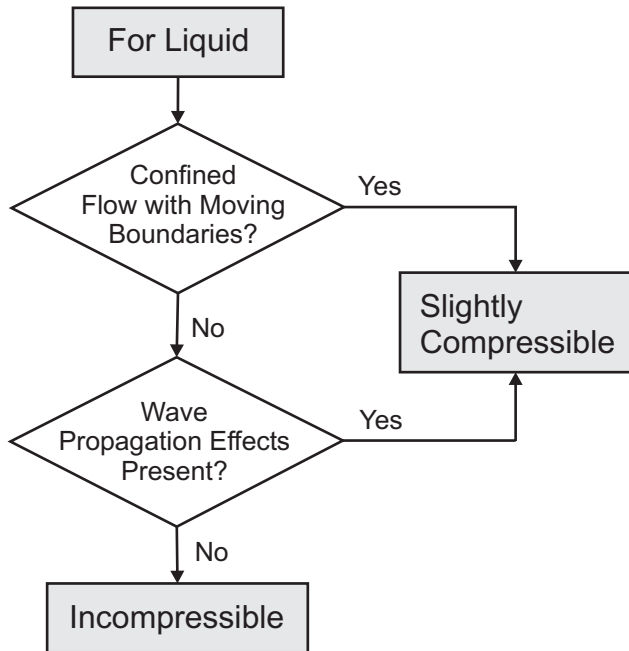
A significant strength of ADINA is the capability to analyze problems involving specular radiation. In such problems, the solid boundary is highly reflective and the energy from an incident ray can be specularly reflected, diffusely reflected, absorbed, or transmitted as illustrated in the figure below.

The specular radiation capability in ADINA is now used by various leading automotive headlamp companies for their analyses.



Fluid Flow Analysis

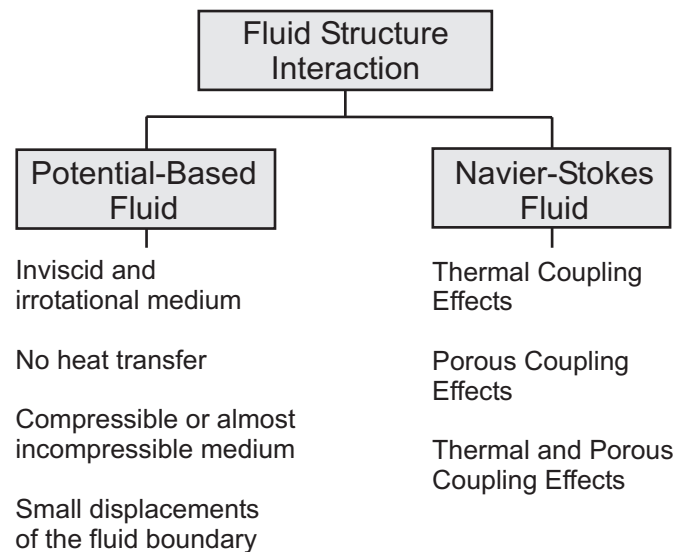
ADINA can be used for the analysis of a wide range of fluid flow problems where the flow can be incompressible, slightly compressible, low-speed compressible, or high-speed compressible. The flowcharts below provide a general guide on which flow compressibility to use.



Fluid Structure Interaction

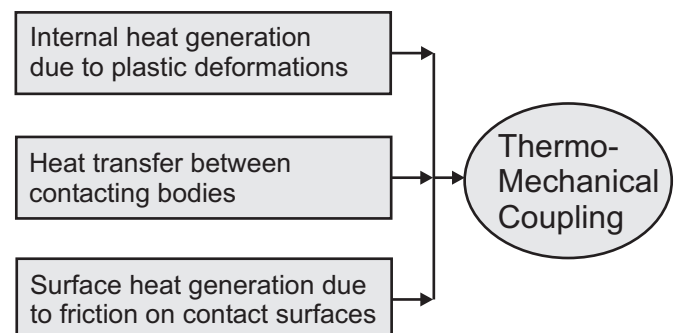
ADINA has unique strengths for fluid structure interaction (FSI) analysis. In an FSI analysis, the fluid can be modeled as a potential-based fluid or a Navier-Stokes fluid.

Modeling the fluid as a Navier-Stokes fluid offers the full range of FSI features available. However, it requires more computer resources and computation time for the solution. Thus, the potential-based fluid should be used when the assumptions are valid for the analysis.



Thermo-Mechanical Coupling

In a thermo-mechanical coupling (TMC) analysis, the thermal solution affects the structural solution and the structural solution affects the thermal solution. The following effects can be included in the analysis.



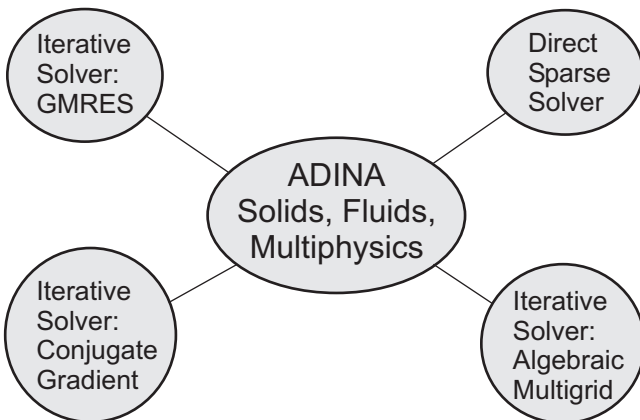
Solver Technology

The ADINA System has state-of-the-art direct and iterative solvers to effectively handle problems of different sizes.

The direct sparse solver and iterative solvers can be used for the analyses of solids and structures, fluid flows and multiphysics problems as shown below.

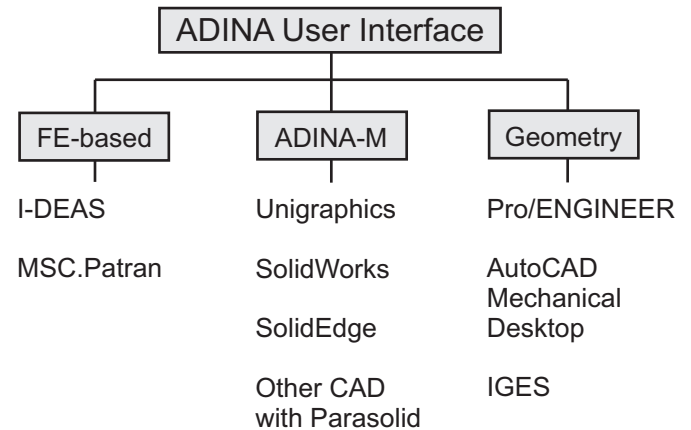
The direct sparse solver has been used effectively for the analyses of solids and structures for up to about 1 million equations. As an example, a linear static shell analysis problem with 260,000 equations is solved using ADINA in about 5 minutes on a 933 MHz Pentium III PC with 512 MB RAM.

For problems with more than a million equations, the iterative solver is more effective considering the current computer technology. ADINA has been used to solve problems with up to 10 million equations using the iterative solver.



CAD Interfaces

The ADINA System supports interfaces to other CAD and modeling systems. The interfaces can be based on finite elements (FE-based) or geometry. In addition, the ADINA modeler (ADINA-M) can directly import geometry from any Parasolid-based CAD system.



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

As we start a New Year, please mark your new 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.”

Please check out the Conference web site at <http://www.secondmitconference.org> for details.

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