Computational Fluid Dynamics Flow Modeling Software

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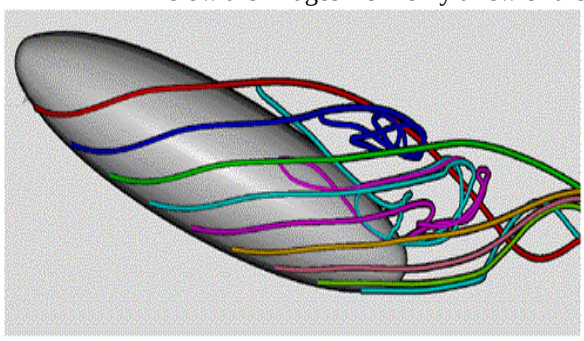
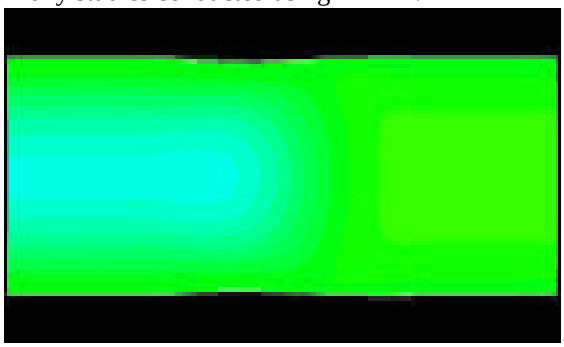
Computational fluid dynamics has far reaching applications in any industry where the study of the interaction between fluids and structures is necessary. For example, the automotive industry works on optimizing the aerodynamics of a car, scientists working on a 'bio-chip' need to know the effects of the electric field on surrounding arteries, Biomedical engineers developing a heart valve weigh the benefits of rigid versus flexible, and doctors consulting a model of a patient's aneurysm assess the danger prior to surgery. All of the above scenarios have been benefited by the development of Fluid-Structure Interaction, or FSI, software.

The Functional Image Data Analysis Package, or FIDAP, is one such FSI software tool that has proved its worth in the Biomedical Engineering arena. The software is developed by Fluent Inc., which has its headquarters in Lebanon, New Hampshire, and additional offices in Europe. The benefits of using this particular software tool range from ease in detailed product development to design optimization to help with trouble shooting, which all add up to reduced engineering costs.

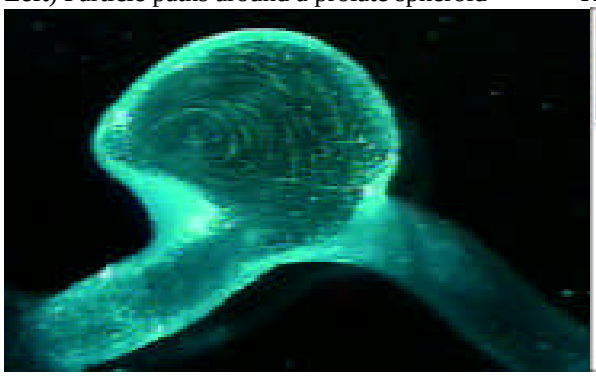
Below are images from only a few of the many studies conducted using FIDAP:



Left) Particle paths around a prolate spheroid



Right) Fluid flow within a compliant artery or vein



Left and Right) Contrasting photographic (L) and FIDAP modeling (R) images of a fluid filled chamber

Prior to the release of FIDAP 8.5, engineers would have had to solve FSI problems by transferring files from a computational fluid dynamic, or CFD, solver to a structural solver and back. FIDAP 8.5 combines these two into a powerful software tool that takes into account deformation, deflection, flow induced vibrations of slender structures, and thermal stresses among many other factors. It solves for the linear and non-linear elastic response of the solid whether in a steady or unsteady problem.

The process begins by taking multiple 2D scans of the object, which get compiled by an image processor to determine the 3D geometry. The combined motion of the fluids and structures involved is simulated by FIDAP and reduced to mathematical equations.

Sources:

http://www.fluent.com
http://www.ncbi.nlm.gov
http://www.lbc.nimh.nih.gov
http://www.fdi.com