

Process Industry CFD Continues to Strengthen

By Ahmad Haidari, Industry Director for the Chemical and Process Industry

During the past several years, Fluent has provided a tremendous number of software enhancements and new capabilities for applications in the chemical, petrochemical, oil and gas, power generation, and other process industries. Fluent customers in this diverse group of industries want to solve complex problems in complex geometries with relative ease of use. Through a triad of support from our customers, collaboration with our partners, and the strength of our technology development, Fluent has been able to keep a strong focus on the modeling needs within the process industries. Through continuous development of, and improvements to, a comprehensive suite of software (FLUENT,

FIDAP, and POLYFLOW), we have been able to provide increasingly valuable analysis and design tools for engineers. Today, Fluent CFD software is used routinely alongside experiments, correlations, and other analysis methodologies to help engineers better understand their flow related problems.

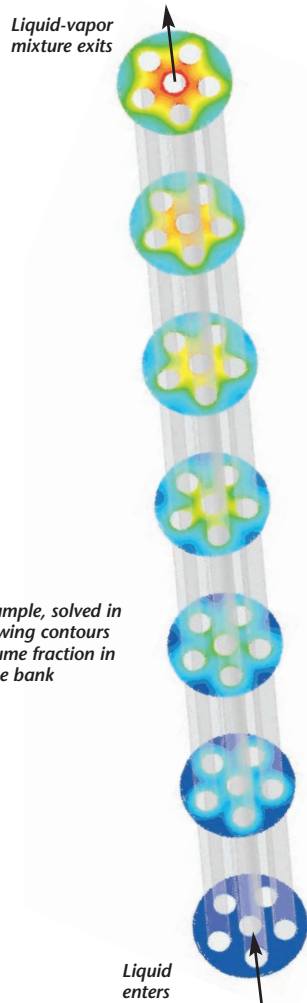
The large extent of Fluent's development efforts for the process industries reflect the fact that the underlying need for CFD in these industries is as strong as it is for all other industries. Nowadays, engineers in all disciplines are required to "do more with less." This means that they must design better equipment, retrofit existing equipment, and optimize processes, so that they can produce more of the final product, with improved quality, at a lower cost, and in less time. This has led to the development of software technologies that can help meet both the ease-of-use and applicability requirements of engineers in these industries.

To improve upon the ease-of-use, Fluent has strengthened GAMBIT, our general purpose preprocessor, to offer CAD connectivity, geometry import and clean up, and enhanced mesh generation capabilities (by adding such features as sizing functions and hex-core meshing). On the solver side, ease-of-use is provided through a set of problem-specific templates (for cyclone separators, for example) and software products such as Airpak and MixSim, which are designed to set up and solve an industry-specific class of problems in HVAC and

industrial mixing, respectively.

To help meet the applicability requirements, Fluent has been developing CFD technology for solving problems with complex physics in a complex setting. For example, the dynamic mesh model in FLUENT can be used to model flows in domains with moving boundaries (such as control valves). Multiphase flows with mass and heat transfer, spray break-up, cavitation, and reacting flows that account for turbulence-chemistry interaction and/or surface reaction, are all available in FLUENT in an integrated environment that offers full interoperability between models. FIDAP offers unique capabilities for modeling fluid-structure interaction and free surface flows, using either the ALE or VOF methods. For polymer processing applications, POLYFLOW handles flows with complex rheology, including viscoelasticity, and offers specialized models that are needed for applications such as blow-molding, extrusion, and die design. The unique mesh superposition technique is available for modeling intermeshing screws and mixers.

The collection of articles presented in this supplement illustrates only a small sampling of applications that make use of the capabilities available in Fluent software. The articles cover such topics as erosion, mixing, separation, and heat exchanger design. It is interesting to note that only a few years ago, many of these simulations were considered too difficult to tackle! ■



A boiling example, solved in FLUENT, showing contours of vapor volume fraction in a heated tube bank

Mesh detail

