

MAE Praxair Seminar

Recent Trends in Computational Fluid Dynamics at GE

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Computational fluid dynamics is essential to the design of modern aircraft engines and gas, steam, and wind turbines. Recent advances in unstructured CFD meshing and vast increases in computational power made possible by large low-cost clusters of Linux processors have enabled CFD simulations to have even greater impact on the aerodynamic and thermal design of these machines.

Unstructured meshing can enable a designer to mesh very complicated geometries in far less time, enabling the CFD analysis of problems formerly thought impractical. CFX-Mesh, developed over a period of ten years of joint development between the GE Global Research Center and CFX, is a commercial example of an unstructured hybrid prismatic / tetrahedral mesh generator. This mesher has generated meshes in size exceeding 1 billion elements, and has proven its mettle on a wide range of complicated industrial problems. The first half of this seminar will discuss the meshing algorithms used in CFX-Mesh, and show some examples of its use at GE.

Parallel processing on large clusters of Linux processors has enabled much larger CFD problems to be handled. More computational power allows the use of finer meshes to capture more geometric fidelity, more components to be modeled simultaneously to capture interaction effects, transient simulations to capture unsteady effects, and advanced physical models to better capture turbulence effects. The second half of this seminar will discuss recent GE efforts in Large Data Set computation using CFX for computational fluid dynamics applications.

Bio

Dr. Mark E. Braaten is a Senior Engineer at the GE Global Research Center, working in the Fluid Mechanics Laboratory. He was one of the principal developers of CFX-Mesh. His areas of interest include unstructured CFD mesh generation, large data set computation, parallel computing, and gas, steam, and wind turbine aerodynamics. Mark received his BS/MS in Engineering Science at SUNY Buffalo, and his PhD in Mechanical Engineering at the University of Minnesota, working with Professor Suhas Patankar. In his 22-year career at GE, he has more than 30 publications and conference papers in the area of CFD, and 3 patents. Mark also was a developer of a number of in-house CFD codes used within GE for simulation of gas turbine combustion, and internal aerodynamics in gas and steam turbine engines.

206 Furnas Hall

Thursday, October 4, 2007

Seminar 3:00 pm - 4:00 pm

Reception 4:00pm - 4:30pm