Meeting: 1002, Pittsburgh, Pennsylvania, SS 5A, Special Session on Multiscale Algorithms in Computational Fluid Dynamics

1002-76-88 **William J. Layton*** (wjl@pitt.edu), Math Dept. 301 Thackery Hall, University of Pittsburgh, Pittsburgh, PA 15260. *Multiscale Algorithms and Models for Turbulent Flows.*

This talk will present selected results from two recent ideas for the simulation of the motion of the large structures in a turbulent flow: a recennt variational multiscale method and an approximate deconvolution model of turbulence. The first is a novel approach to variational multiscale methods. The general VMM approach was introduced by T. Hughes. When the large structures/ means are defined by elliptic (or Stokes) projection of fluid stresses new algorithmic possibilities open up. These possibilities have been explored by the speaker and S. Kaya, B. Riviere, F. Pahlevani, V. John and others. In particular, for the Oseen problem, the new approach converges uniformly in the Reynolds number (work of S. Kaya). Approximate deconvolution models (ADMs) of turbulence were introduced in the 90's by Adams and Stolz. Recently, using techniques introduced by the speaker and R. Lewandowski, a complete theory of the models has been developed by A. Dunca and Y. Epshteyn. This talk will present these very promising models, review the theory and present new bounds for the model's time-averaged consistency error which establish accuracy and feasibility of LES using ADM's. (Received September 03, 2004)