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

1002-76-229 **Jeff Borggaard*** (jborggaard@vt.edu), Department of Mathematics, McBryde Hall, Blacksburg, VA 24061, **Traian Iliescu**, VA, and **Alexey Miroshnikov**, VA. *Sensitivity Analysis for Large Eddy Simulation Modeling.*

If large eddy simulation (LES) is to become a robust tool for accurate prediction of complex fluid flows, two modeling issues need to be addressed. These are: closure models and boundary condition models. In this talk, we study the application of sensitivity analysis (computing derivatives of flow variables with respect to modeling parameters) to evaluate these models. Either automatic differentiation, finite differences or hand coding can be used to implement these derivatives in existing softare. We discuss the computation of derivatives by automatic differentiation and consider a number of applications, including parameter identification, uncertainty analysis, and model reduction. As the primary vehicle for this discussion, we use the one- and two-dimensional Burgers equations. Closure models we consider include the popular eddy-viscosity model and a Padé-motivated deconvolution model. Extensions to flows modeled by two- and three-dimensional Navier-Stokes equations will be discussed. (Received September 14, 2004)