Variational and Multiscale Methods in Turbulence with Particular Emphasis on Large Eddy Simulation

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We describe recent progress in the formulation and development of Large Eddy Simulation procedures utilizing variational methods in place of traditional filtering techniques and employing multiscale decompositions of underlying function spaces. The approach provides a framework for simultaneously addressing theoretical issues concerning the foundation of Large Eddy Simulation procedures and practical modeling issues. Computations employing the simplest instantiations of the ideas are presented for homogeneous isotropic flows and wall-bounded flows and in all cases very good results are obtained.