Meeting: 1000, Albuquerque, New Mexico, SS 9A, Special Session on Mathematical Methods in Turbulence

1000-39-105 **Piotr K. Smolarkiewicz*** (smolar@ucar.edu), NCAR, P.O. Box 3000, Boulder, CO 80307, and **Joseph M. Prusa**. *Simulation of geophysical turbulence: Dynamic grid deformation.*

With mesh adaptivity for simulating complex geophysical flows in mind, we have developed a generalized mathematical framework for the implementation of deformable coordinates in a generic Eulerian/semi-Lagrangian format of nonoscillatory forward-in-time (NFT) schemes. The key element of the framework is a time-dependent coordinate transformation, implemented rigorously throughout the governing equations of the nonhydrostatic anelastic model for simulating a broad range of idealized atmospheric/oceanic flows on scales from micro to planetary. A computational model that is designed from the bottom up combining NFT algorithms and generalized coordinates is ideally suited for continuous grid adaptation. The robust performance of NFT methods enables the ability to mimic "nested" grids and to accommodate large-amplitude undulations of the model boundaries. Furthermore, since NFT methods offer a means of implicit subgrid-scale modeling, even an explicitly-inviscid model formulation can be quite effective in assuring a quality large-eddy-simulation of high Reynolds number geophysical flows. (Received August 19, 2004)