A COMPARISON OF MULTILEVEL ADAPTIVE METHODS
FOR HURRICANE TRACK PREDICTION*

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Abstract. Adaptive multilevel methods are described and tested for the problem of predicting the path of a moving hurricane. The physical model consists of conservation of vorticity in a two-dimensional incompressible fluid; the discrete model uses conservative second-order finite differences. The methods described are the Berger-Oliger (BO) algorithm, with the Poisson problem for the streamfunction solved by standard multigrid techniques, and a full approximation scheme multigrid (MG) algorithm which incorporates more complete interaction between the computational grids. Numerical results are presented demonstrating the conservation properties, convergence, accuracy, and efficiency of the methods. Adaptive mesh refinement produces speedup factors of 10–20 compared to using uniform resolution. Differences between the performance of the BO and MG methods are slight.

Key words. multigrid, multilevel, adaptive, incompressible, hurricane.

AMS subject classifications. 65M50, 65M55, 76C15, 86A10.

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