Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Modeling and Data Assimilation of the Velocity of Jupiter's Great Red Spot and Red Oval SUSHIL SHETTY, Mechanical Engineering, University of California, Berkeley, XYLAR ASAY-DAVIS, Applied Science and Technology Group, University of California, Berkeley, PHILIP S. MARCUS, Mechanical Engineering, University of California, Berkeley — Data assimilation and modeling techniques are applied to new velocity fields of Jupiter's Great Red Spot (GRS) and Red Oval to determine quantities of physical interest such as the Rossby deformation radius (i.e., the vertical stratification) and the distribution of potential vorticity. One technique parameterizes the set of steady solutions to the shallow-water (SW) equations in terms of several unknowns, which include the deformation radius and the forcing from deeper layers. A genetic algorithm is used to determine the unknown parameter values such that a SW solution matches the input velocities to within the observational uncertainties. This typically results in a range of acceptable values for each parameter. However, only a subset of these values gives stable solutions, so that the range of acceptable parameter values is reduced. Models are also used to deduce the physics that makes the GRS "hollow," i.e., have a minimum of potential vorticity in its interior.

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Date submitted: 04 Aug 2006 Electronic form version 1.4