1019-35-129   **Chjan Lim** and **Junping Shi*** (`shij@math.wm.edu`), Department of Mathematics, College of William and Mary, Williamsburg, VA 23187. *A variational problem in climate dynamics.*

Barotropic vorticity equation (BVE) is a minimal inviscid approximation to some complex damped driven fluid systems such as the terrestrial general circulation model (GCM). This model provided the basis for the first numerical simulation of global atmospheric circulations using the ENIAC (world's first electrical computer) in 1950. We formulate a constrained variational problem on the rotating sphere to study the superrotation of some atmospheres, like Jupiter and Titan. The constraints consist of fixed relative enstrophy, fourth order moment, and zero circulation, and the Euler-Lagrange equation is a nonlinear integral equation. Direct method and saddle theorem are applied to the variational problem to obtain steady state solutions. (Received August 12, 2006)