1023-86-312 **Chjan C Lim*** (limc@rpi.edu), Dept of Mathematical Sciences, RPI, Troy, NY 12180. *Exact solutions of a spherical model for the energy-enstrophy theory of a barotropic fluid coupled to rotating massive sphere.*

A family of spin-lattice models are derived as convergent finite dimensional approximations to the rest frame kinetic energy of a barotropic fluid coupled to a massive rotating sphere. In not fixing the angular momentum of the fluid component, there is no Hamiltonian equations of motion of the fluid component of the coupled system. This family is used to formulate a statistical equilibrium model for the energy - relative enstrophy theory of the coupled barotropic fluid - rotating sphere system, known as the spherical model, which because of its microcanonical constraint on relative enstrophy, does not have the low temperature defect of the classical energy - enstrophy theory. Exact solution of this model provides critical temperatures and amplitudes of the ground modes - super-rotating solid body flows - in the BECondensed phase. The super-rotating condensed phase is compared to the super-rotating Venusian Middle Atmosphere and also to recent experiments in decaying 2D turbulence in a square domain with no slip boundary conditions (cf. Sommeria, Tabeling , Van Heijst et al) where net angular momentum plays a role. (Received September 05, 2006)