

Abstract Submitted  
for the DFD05 Meeting of  
The American Physical Society

**Hamiltonian Description of Riemann Ellipsoids via Dirac's Bracket** N.R. LEBOVITZ, University of Chicago, P.J. MORRISON, University of Texas at Austin, J.A. BIELLO, University of California at Davis — The only known exact solutions of the Euler equations for an asymmetric, self-gravitating mass are the Riemann ellipsoids. They are characterized by motions of uniform vorticity in a rotating reference frame, and are governed by a finite-dimensional system, i.e., a system of ordinary differential equations. A noncanonical Hamiltonian description in terms of a finite number of moments of velocity and density was first written down by Rosensteel, for the case when the fluid is unconstrained by the assumption of incompressibility. We show that this system can be obtained systematically by a moment reduction from the compressible-fluid bracket. We then employ the Dirac- bracket procedure to incorporate the constraint of incompressibility in this finite-dimensional system and show that the resulting bracket precisely confirms the moment-reduction obtained directly from an incompressible-fluid bracket, as described in the companion paper.

Norman Lebovitz  
University of Chicago

Date submitted: 12 Aug 2005

Electronic form version 1.4