

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Onsager reciprocity relations derived from Maxwell reciprocity relations HOWARD BRENNER, MIT — Based upon recent work by the author [H. Brenner, “Bi-velocity hydrodynamics,” *Physica A* 388 (2009) 3391-3398] devoted to the foundations of fluid mechanics and transport processes, a simple model of linear irreversible thermodynamics (LIT) is developed. On the basis of this the Onsager Reciprocal Relations (ORR) applicable to LIT are shown by purely macroscopic arguments to be a direct consequence of Maxwell’s Reciprocal Relations (MRR) governing equilibrium thermodynamics. Among other things, this work answers a fundamental question raised by B. D. Coleman and C. Truesdell [“On the reciprocal relations of Onsager,” *J. Chem. Phys.* 33 (1960) 28-31] regarding the need for a rational basis for choosing a compatible set of forces and fluxes for which the ORR are a priori valid.

Howard Brenner
MIT

Date submitted: 10 Aug 2009

Electronic form version 1.4