New more precise Landau fluid closures

Peter Hunana (1), Gary Zank (1), Monica Laurenza (2), Gary Webb (1), Melvyn Goldstein (3), and Laxman Adhikari (1)

(1) The University of Alabama in Huntsville, CSPAR, AL, USA (peter.hunana@gmail.com), (2) INAF, Istituto di Astrofisica e Planetologia Spaziali, Rome, Italy, (3) NASA Goddard Space Flight Center, Greenbelt, MD, USA

Collisionless fluid models that describe the kinetic effect of Landau damping in the fluid formalism require construction of a closure, where the the last retained fluid moment is expressed through lower-order fluid moments, by finding a suitable Pade approximant for the kinetic plasma dispersion function or the plasma response function. The technique was pioneered by Hammett and Perkins PRL 1990. We would like to present several new Landau fluid closures that describe the effect of Landau damping with higher accuracy. The new closures are especially useful when the electron temperature is comparable to the proton proton temperature, or when the electron temperature is much higher than the proton temperature.