Hamiltonian closures for reduced fluid models

Emanuele Tassi[1]

[1] *CNRS, Centre de Physique Théorique, Marseille, France*

Reduced fluid models have proved to be valuable tools for investigating at least qualitative aspects of phenomena such as, for instance, instabilities, turbulence and magnetic reconnection. For strongly magnetized plasmas with negligible finite Larmor radius effects, reduced fluid models can be derived from truncations of the infinite hierarchy of evolution equations obtained "by taking moments" of drift-kinetic systems. When dissipative effects are also omitted, the parent drift-kinetic systems are supposed to possess a Hamiltonian structure. Unless dissipation is voluntarily introduced in the resulting reduced fluid model, the closure relation adopted to truncate the infinite hierarchy of moment equations, should be such to preserve the Hamiltonian structure in the resulting fluid model. In this contribution I will consider moment equations obtained from Hamiltonian drift-kinetic systems in the so called "delta f" approximation, and present closure relations that lead to Hamiltonian reduced fluid models.