Workshop

Analysis of transport equations:

Vlasov and related models

Talk given by

Alain Brizard

Title. *Recent advances in the variational formulation of reduced Vlasov-Maxwell equations.*

Abstract. Recent advances in the variational formulation of reduced Vlasov-Maxwell equations are presented. First, the variational formulations of guiding-center Vlasov-Maxwell theory based on Lagrange, Euler, and Euler-Poincaré variational principles are presented. Each variational principle yields a different approach to deriving guiding-center polarization and magnetization effects into the guiding-center Maxwell equations. The conservation laws of energy, momentum, and angular momentum are also derived by Noether method, where the guiding-center stress tensor is now shown to be explicitly symmetric. Next, the Eulerian variational principle for the nonlinear electromagnetic gyrokinetic Vlasov-Maxwell equations is presented in the parallel-symplectic representation, where the gyrocenter Poisson bracket contains contributions from the perturbed magnetic field.