
MAMERN'07 INVITED SPEAKER

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Fluid-Particles Interaction Models: Asymptotic Models and Simulation

We are interested in coupled microscopic/macrosopic models describing the evolution of particles dispersed in a fluid. Fluid-particle interaction is of primarily importance in sedimentation analysis of disperse suspensions of particles in fluids, one of the issues being the separation of the solid grains from the fluid by external forces: gravity settling processes or centrifugal forces. On the other hand, aerosols and sprays can be also modelled by fluid-particle type interactions in which bubbles of suspended substances are seen as solid particles.

The system is modelled using a Vlasov-Fokker-Planck equation to describe the microscopic motion of the particles coupled to the Euler equations for a compressible fluid. We investigate dissipative quantities, equilibria and their stability properties and the role of external forces. We also study some asymptotic problems, their equilibria and stability and the derivation of macroscopic two-phase models. Numerical schemes capable of dealing with the asymptotic limit situations are proposed. Numerical simulations will be shown. This is a research in collaboration with T. Goudon and P. Lafitte (Univ. Lille).
