

Validation of models for sprays

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We consider complex fluids consisting of a dispersed phase (solid particles or liquid droplets) immersed in a gas.

A class of models describing the dynamics of such a kind of systems is given by a system of partial differential equations where a kinetic equation, describing the dispersed phase, is coupled to a fluid equation for the background gas. The coupling is given by the drag force exerted by the gas on the dispersed phase.

Within this class, we shall analyse the case where the kinetic equation is a Vlasov-type equation and the fluid equation are of Stokes or Navier-Stokes type.

We shall discuss the validation problem for this class of models, i.e. the derivation of the equations of the model from evolution equations given on a scale which can be considered "microscopic" with respect to the final one; in particular we shall analyse the difficulty of dealing with a particle model for the system ([1, 2]), and the (formal) derivation of the Vlasov-(Navier-)Stokes model from a multiphase Boltzmann model in suitable asymptotics ([3]).

The results have been obtained in collaboration with E.Bernard, L.Desvillettes, F.Golse.

References

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- [3] Bernard, E. and Desvillettes, L. and Golse, F. and Ricci, *A derivation of the Vlasov-Navier-Stokes model for aerosol flows from kinetic theory*, preprint.