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Fluid-Particle flows: a thin spray model with energy exchange

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The models we want to investigate describe the evolution of a dispersed phase (droplets, particles...) interacting with a dense phase (ambient fluid). Those models can be used in numerous applications, such as combustion phenomena or environment issues.

This study is based on recent works [1,2] in which some relevant asymptotic regimes are identified and numerical methods for the equations are tested, under a condition of reasonable numerical cost.

Nevertheless, the models in [1,2] remain isentropic. It seems very important to take the energy equation into account, since the fluid viscosity, which is a key quantity in the friction force between both phases, naturally depends on the temperature.

This study aims at extending the numerical methods and simulations in [2] in the case when the fluid is described by the full system of Euler equations, including heat exchange.

References.

[1] J.-A. Carrillo and Th. Goudon. Stability and asymptotics analysis of a fluid-particles interaction model. *Comm. P.D.E.*, 31:1349—1379, 2006.

[2] J.-A. Carrillo, Th. Goudon and P. Lafitte. Simulation of Fluid & Particles Flows: Asymptotic Preserving Schemes for Bubbling and Flowing Regimes. To appear in *J. Comput. Phys.*