Mathematical analysis of the compressible fluids, application to a bi-fluid model for a mixture of two compressible, non-interacting fluids with general boundary data or with applications to fluid-structure.

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We introduce the mathematical theory of compressible fluids by P. L. Lions and E. Feireisl, and show the extension of this theory to a model of a one-velocity Baer-Nunziato system with dissipation describing a mixture of two non-interacting viscous compressible fluids in a piecewise regular Lipschitz domain with general inflow/outflow boundary conditions. It is a joint work with S. Kracmar, Y-S. Kwon and A. Novotny [1].

Such existing theory was applied to more complicated problems, e.g., to the interaction between two compressible mutually noninteracting fluids and a shell of Koiter type encompassing a time-dependent 3D domain filled by the fluids. It is a joint work with Martin Kalousek and Sourav Mitra [2].

Moreover, we give a rigorous justification of the incompressible inviscid limit of the compressible fluid-structure interaction problem with a flat reference geometry, in the regime of low Mach number, high Reynolds number, and well-prepared initial data in the case of barotropic fluid. It is a joint work with Sourav Mitra and Yadong Liu [3].

References:

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