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# COMPRESSIBLE MULTI-MATERIAL MECHANICS

## COMPUTATIONAL MECHANICS

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## ABSTRACT

One current challenge for continuum mechanics is the definition of a useful mathematical setting for the prediction of motions encompassing various materials, from solids to fluids. The quest can be motivated by many configurations and applications (fluid-structure coupling, multi-phase flows, phase changes, etc.). One promising direction builds on a *symmetric-hyperbolic* system of unified equations for the Eulerian description of various *compressible* materials, from solids to fluids, that makes use of internal variables and an updated Lagrangian description to cover various rheologies. Then the challenge precises: how to reliably simulate multi-material flows from such a system, up to the propagation of shock waves? How far can such a unifying system capture the physics of multi-phase mass transport?

The symposium will try to give an overview of the questions and answers currently discussed in the above-mentioned framework: which internal variables should be chosen? How can we build updated Lagrangian descriptions covering a wide range of rheologies? Should the mathematical definition start from discrete Lagrangian or Eulerian approaches? How do the above questions and potential solutions deal with discrete models for numerical simulation? How should we address singularities (shock waves, fracturing), especially when non-conservative systems are at stake (e.g. multi-phase flow models, compressible turbulence models)? etc.

In addition to the organizers, speakers are expected from a well-identified, distinguished list of scientists including S. Gavrilyuk (University of Aix-Marseilles, agreed), A. Gil and C.-H. Lee (University of Glasgow), J. Bonet (CIMNE), M. Dumbser and I. Peshkov (University of Trento), etc.

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