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Thermodynamically coherent models for three-phase transition

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We present in this talk a model for the transition between three possible phases of a same compressible fluid. To do this, we extend the usual formalism based on maximizing the specific entropy of the mixture to the three-phase case and study in particular the characterization of the triple point, which corresponds to the pressure and temperature values at which the three phases can coexist. We then deduce a (non-strictly) convex entropy at thermodynamic equilibrium. Focusing on the case of tin and its liquid, beta solid and gamma solid phases, we construct a complete equation of state and study a wide range of exact solutions to the associated Euler equations. This is a joint work with Hervé Jourdren and Corentin Stéphan.

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