A nonisothermal model for two-phase fluids

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In this talk we address a class of PDE systems describing phase-separation in (incompressible) fluids in a non-isothermal setting. These models are derived from the basic balance laws for total energy and entropy along the general procedure described, e.g., in [2]. We present mathematical results both referring to two and to three dimensions of space. In 3D, we can prove existence of (at least) one solution for a suitable weak formulation of the model, where, along the lines of [1], the heat equation is replaced by the balance of total energy complemented with the entropy inequality. In 2D, we additionally have instantaneous parabolic regularization effects (implying, in particular, that the equations can be interpreted in a stronger form for all times $t > 0$). Moreover, we obtain asymptotic pre-compactness of trajectories. This is a joint work with Michela Eleuteri and Elisabetta Rocca from the University of Milano.

References

[1] *M. Bulíček, E. Feireisl, J. Málek*: A Navier-Stokes-Fourier system for incompressible fluids with temperature dependent material coefficients. Nonlinear Anal., Real World Appl. *10* (2009), 992–1015.

[2] *M. Frémond*: Non-Smooth Thermomechanics. Springer-Verlag, Berlin, 2002.