# Well-posedness results for mixed-type PDE systems modelling pressure-driven multicomponent flows

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In this talk we consider the purely convective mass transport in such isothermal multicomponent fluids for which the velocity field is negative proportional to the gradient of the thermodynamic pressure. The equations of motion formally reduce to the Darcy law, and the main driving mechanism is volume filling. Thus, this type of flow is mathematically related to the theory of transport in porous media. We shall introduce a special equation of state, which allows to define the thermodynamic pressure in a consistent way. This constitutive choice results into a system of PDEs which, after an appropriate change of variables, consists of N-1 first-order transport equations for the volume fractions, and one parabolic second-order equation of porous-medium-type for the volume. We show that this system admits a unique classical or, in less smooth geometrical settings, a unique weak solution. We shall also report on ongoing work concerning the optimal control of the PDE–system. These results are obtained in the context of joined work with A. Jüngel (TU Vienna) and J. Sprekels (WIAS Berlin).