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On the Numerical Simulation of Two Phase Liquid-Vapor Phenomena

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The computation of boiling phenomena raises several difficult issues, one of them being the necessity of accounting for both incompressible and compressible phases in the same computational domain. We have developed two different numerical approaches for dealing with such a situation. One of them makes use of a single pressure which has the status of a thermodynamic pressure and obeys a Helmholtz type equation. The other method is of the Low Mach number type where the pressure is split into a mean thermodynamic pressure defined in the gas phase, and an additional field which ensures mass conservation and which obeys a Poisson equation with an inhomogeneous source term in the gas. These two methods are compared in two simplified configurations consisting of an enclosure subjected to sudden heating at its walls and initially containing either solely a perfect gas or a combination of both an incompressible liquid and a perfect gas.

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