Riemann solvers for compressible isothermal Euler equations for two phase flows with phase transition

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We consider the isothermal Euler equations with phase transition between a liquid and a vapor phase. The mass transfer is modeled by a kinetic relation. Existence and uniqueness results were proven in [1]. We construct a Riemann solver to obtain the numerical solution for associated Riemann problems. This solver generalizes the HLLC solver such that it can take into account mass transfer between the phases. The calculated results will be compared to the exact solutions. Therefor we will highlight the major difficulties and propose possible strategies to overcome these problems. A talk held by Maren Hantke will give further insight to this topic, especially considering the exact solution.

References

[1] M. Hantke, W. Dreyer, and G. Warnecke, Exact solutions to the Riemann problem for compressible isothermal Euler equations for two phase flows with and without phase transition, WIAS Preprint no. 1620 (2011), to appear on *Quarterly of Applied Mathematics*

[2] E. F. Toro, *Riemann Solvers and Numerical Methods for Fluid Dynamics*, Springer-Verlag, (1999)

[3] C. Küchler, *Riemannlöser für isotherme Eulergleichungen in zwei Phasen*, Diploma Thesis, Otto-von-Guericke Universität, (2011)

Joint work with: Maren Hantke, Gerald Warnecke (*Otto-von-Guericke University Magdeburg*)