Computing flows with sharp interfaces between pure and mixed cells

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ABSTRACT

Numerical modeling of flows in two-fluid Euler-Euler formulation can be done either via an averaged physical model [1] or via a numerical model with interfaces [3]. The first vision has the advantage of simplifying interface tracking at the cost of spurious numerical diffusion in mixing zones. The method with interface capturing has a higher numerical cost but prevents numerical diffusion between materials. In this work, a numerical method is proposed for managing both approaches. In addition to the theoretical study and implementation of the model, this poster will focus on the case of three materials cells which contain both a mixture of fluids and an interface with a pure cell.

The proposed numerical model aims at extending the two-fluid FVCF scheme without interface [2] to the interface capturing case and the multimaterial FVCF [3] to two-fluid models. A minimal four equations and one dimension model is considered. Dissipative or corrective terms are neglected and an algebraic differential pressure between fluids is considered. The equations of state considered are polytropic and close to those used for air-water flows modeling.

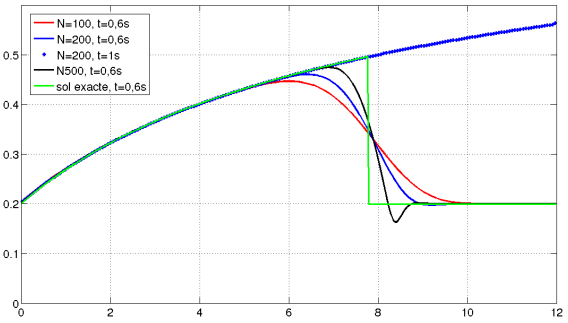

Figure 1: Ransom faucet test case: comparison of the numerical results of void fraction to the exact solution.

References

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