Abstract Submitted
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High-order accurate multi-phase simulations: building blocks and whats tricky about them[1] FLORIAN KUMMER, TU Darmstadt / Chair of Fluid Dynamics — We are going to present a high-order numerical method for multi-phase flow problems, which employs a sharp interface representation by a level-set and an extended discontinuous Galerkin (XDG) discretization for the flow properties. The shape of the XDG basis functions is dynamically adapted to the position of the fluid interface, so that the spatial approximation space can represent jumps in pressure and kinks in velocity accurately. By this approach, the 'h^p-convergence' property of the classical discontinuous Galerkin (DG) method can be preserved for the low-regularity, discontinuous solutions, such as those appearing in multi-phase flows. Within the past years, several building blocks of such a method were presented: this includes numerical integration on cut-cells, the spatial discretization by the XDG method, precise evaluation of curvature and level-set algorithms tailored to the special requirements of XDG-methods. The presentation covers a short review on these building-block and their integration into a full multi-phase solver. A special emphasis is put on the discussion of the several pitfalls one may expire in the formulation of such a solver.

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