



SISMA

Séminaire Informatique Scientifique & Mathématiques Appliquées

Contributions to the modeling and validation of two-phase numerical simulation

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Multiphase flows play a critical role in a wide range of engineering applications, yet their numerical simulation remains a significant challenge due to the complex interactions between distinct phases separated by interfaces.

This presentation presents key contributions to the development and analysis of two classical Eulerian–Eulerian approaches, with a focus on the well-established Baer and Nunziato models. These models are employed to simulate cavitation and shock phenomena, where accurate representation of phase interactions is essential. In addition, we explore recent advances in "all-regime" two-phase models, which offer improved capabilities for capturing smooth transitions across different flow regimes, such as bubbly and cap or slug flows.

The final part of the presentation investigates the use of Physics-Informed Neural Networks (PINNs) for modeling multiphase systems, with particular attention to bubble and cap regime dynamics. Does this emerging approach offer a promising alternative to traditional solvers ?