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Application of the Meshless Local Petrov-Galerkin (MLPG) Method to Rayleigh-Taylor Instability BRYAN SUSI, Applied Research Associates, Inc, BETH SMITH, Applied Reserach Associates, Inc — Legacy simulation techniques are inadequate for applications with complex boundary conditions and multi-material/multi-physics aspects. We applied the Meshless Local Petrov-Galerkin (MLPG) method to a transient, multi-fluid immiscible boundary problem to demonstrate the advantages of using meshless numerical methods for multi-material interactions. The MLPG method uses a domain characterized by a field of nodes where a local region influences the solution at each node. Meshless methods alleviate the burden of grid generation and manipulation. Node by node discretization and solution of the local weak formulation of the governing equations leads to a naturally coupled system of equations and the flexibility to properly handle multiple materials. To date this method has been primarily applied to solid mechanics benchmark problems. The modeling of transient multi-fluid interfaces in multiple dimensions is necessary to solve meaningful applications. We have demonstrated that the MLPG method can solve such problems confirming its potential as an effective method for simulating complex multi-physics/multi-material systems.

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