

The next generation of numerical plasma models must be able to address multi-scale problems where fluid-only approaches lack realism and fully kinetic models are computationally prohibitive. PHARE, a code currently under development, aims at simulating complex plasma systems across a dynamic hierarchy of grids—with varying resolutions and potentially distinct plasma formalisms. This approach, referred to as Adaptive Mesh and Model Refinement (AM2R), selectively enhances both the resolution and physical realism of simulations where and when it is deemed necessary. This work presents the recent progress on the project, focusing on the development of AMR Hybrid-PIC and AMR Hall-MHD solvers.