Abstract Submitted
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The design and implementation of Los Alamos PLasma Simulation (LAPS) code[1] ALESSANDRO CORBETTA, MARIA MISSANELLI, CECILIA PAGLIANTINI, LAURA SCARABOSIO, GIAN LUCA DELZANNO, ZEHUA GUO, BHUVANA SRINIVASAN, XIANZHU TANG, Los Alamos National Laboratory — Los Alamos Plasma Simulation (LAPS) is an integrated modeling code based on a common-data framework for multiphysics simulation of both magnetic and inertial confinment fusion (ICF) plasmas. Its principal design goal is to provide a common data structure on computational grids and plasma states for different components of the multiphysics integration. LAPS provides an optimal mesh generation for one to three dimensional configuration space discretization and an adaptive mesh scheme that equi-distributes application-specified error. The plasma state is defined on this mesh. LAPS supports the solution of moment and kinetic equations using grids, particle-in-cell, Monte-Carlo, and molecular dynamics. The parallel data structure and (non)linear solvers for PDEs are based on PETSc, while the parallel data structure and communication for particle and Monte-Carlo method are native to LAPS. LAPS separates the numerical discretization from application PDEs. The initial focus is on spectral method, including the spectral element/volume and discontinuous Garlekin scheme for conservative PDEs. The initial set of applications for LAPS development include PIC modeling of plasma transport and rotation in field reversed configuration, fluid-moment and kinetic model of tokamak scrape-off layer.

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