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Simulation of Laser Beam Propagation Through NIF Gaspipes MILO DORR, RICHARD BERGER, LAURENT DIVOL, CHARLES STILL, EDWARD WILLIAMS, DUSTIN FROULA, SIEGFRIED GLENZER, OGDEN JONES, NATHAN MEEZAN, Lawrence Livermore National Laboratory — The fully three-dimensional simulation of laser beam propagation and interaction with large-scale NIF plasmas poses a formidable computational challenge even with the largest available computers. A new strategy is therefore being employed to enable the laser plasma interaction (LPI) code pF3d to model NIF gaspipe experiments, requiring the simulation of LPI in several millimeters of plasma for a few nanoseconds. Using a mixed 2D/3D approach, the light propagation and hydrodynamic equations are solved in a 2D plane while heat conduction and energy deposition are computed on a 3D coarser grid (called the collar grid) that extends far beyond the laser beam. By assuming an axisymmetric beam, the 3D conduction source is obtained by rotating the 2D laser intensity about the symmetry axis. A dynamic renormalization of laser intensity is performed to account for beam spreading in the omitted third dimension. This approach has been used to show that the use of polarization smoothing and smoothing by spectral dispersion allows efficient propagation through ignition scale plasmas on NIF.

Prefer Oral Session
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Richard Berger
berger5@llnl.gov
Lawrence Livermore National Laboratory

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