Development and verification of HiFi – an adaptive implicit 3D high order finite element code for general multi-fluid applications[1] V.S. LUKIN, PSI-Center, University of Washington, A.H. GLASSER, Los Alamos National Laboratory, W. LOWRIE, E. MEIER, U. SHUMLAK, PSI-Center, University of Washington, M. SATO, NIFS, Japan — A three-dimensional (3D) implicit high order finite (spectral) element code HiFi, based on the well established two-dimensional SEL code [1], is now operational and continues to be developed at the PSI-Center of the University of Washington. The distinguishing capabilities of the code include fully 3D adaptive spectral element spatial representation with flexible multi-block geometry, highly parallelizable implicit time advance, and general flux-source form of the PDEs and boundary conditions that can be implemented in its framework. The two-dimensional version of the code has been extensively verified and used for simulations of various multi-fluid plasma physics phenomena, including magnetic reconnection, cylindrical tokamak sawtooth oscillations and FRC translation. The 3D code verification studies and the latest status of the code development effort will be presented. [1] V.S. Lukin, Ph.D. Dissertation, Princeton University (2007).

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