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Multi-Block Development and Application to a Shear Flow Z-Pinch Kink Mode Stabilization W. LOWRIE, U. SHUMLAK, A.H. GLASSER, University of Washington, V.S. LUKIN, Naval Research Laboratory, PSI CENTER COLLABORATION — Recent improvements to the 3D high-order finite (spectral) element HiFi code allow for combining multiple domain blocks into a single computational domain. The blocks themselves must be structured, but the collection of blocks can be unstructured, forming a semi-structured high-order finite element hexahedral mesh. This new feature allows for much more complex and realistic domains to be modeled, including body-fitted and non-simply connected 3D geometries. Additionally an a priori mesh quality analysis is applied to the new meshes to better understand the error associated with deformed mesh elements that result from the more complex geometric domains. Using this new capability of the HiFi code, a verification study of Z-Pinch stability against external kink is performed on a semi-structured cylindrical grid. Applications of a shear flow stabilized Z-Pinch with non-axisymmetric geometry are also presented. The non-axisymmetric geometry aims to model changes in the ZaP Z-Pinch experiment design at the University of Washington, and will provide predictive modeling feedback to the experiment.

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