Ensemble/Variational Estimation (EnVE) and its application to turbulent flows in complex geometries JOSEPH CESSNA, CHRISTOPHER COLBURN, THOMAS BEWLEY, University of California-San Diego, FRANK HAM, QIQI WANG, GIANLUCA IACCARINO, Stanford University — A new algorithm, Ensemble/Variational Estimation (EnVE), has been developed as a consistent hybrid data assimilation method that combines the nonlinear statistical propagation properties of the Ensemble Kalman Filter (EnKF) and the retrospective analysis capabilities of 4DVar/Moving Horizon Estimation (MHE). A sophisticated C++ object-oriented framework has been developed that implements the EnVE algorithm to facilitate its application to any complex (multiscale/multiphysics) flow code of interest in a highly parallel fashion with minimal changes to the existing flow solver. In the present work, this framework has been applied to the flagship unstructured LES code (CDP) developed at the Center for Integrated Turbulence Simulations (CITS) at Stanford University.

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