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Novel Strategies for Coupling 3D LES with ODT Solutions Based on Wavelet and Assimilation Methods YUQIANG FU, TAREK ECHEKKI, North Carolina State University — The LES-ODT approach is a multi-scale framework for the simulation of turbulent reacting flows. It is based on the implementation of two solutions: 1) LES for continuity and momentum and 2) ODT for momentum and reactive scalars. The coupling is based on upscaling, which filters the ODT solution for the filtered density onto LES and upscaling, which corrects the ODT momentum solution to make it consistent with the LES solution. Wavelet-based downscaling uses the compound wavelet matrix method to substitute large-scale physics from LES onto the ODT solution, while maintaining the ODT residual subgrid scale contribution intact. A Kalman filter based upscaling is used obtain a smooth filtered density field from ODT. The present study demonstrates the use of the upscaling and downscaling methods for a LES-ODT simulation of a reacting flow.

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