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Simulation of wall-bounded turbulent flow using ODTLES[1] ALAN KERSTEIN, ESTEBAN GONZALEZ, RODNEY SCHMIDT, Sandia National Laboratories — Subgrid closure of coarse-grained simulations is challenging near walls and for multi-physics applications such as reacting flows. ODTLES [1] avoids coarse-grained advancement, yet is less costly than direct numerical simulation. In ODTLES, the smallest scales of motion are resolved on three arrays of sub-domains, such that each array fills the flow volume and provides full resolution in one coordinate direction. Within each sub-domain, one-dimensional turbulence (ODT) [2] simulates turbulent flow advancement in the resolved direction. A 3D advection step followed by pressure projection couples the sub-domains so as to capture large-scale 3D motion without requiring advancement of filtered flow variables. ODTLES has been used to simulate decaying homogeneous turbulence [1] and in the present study is extended to wall-bounded flows. The capability to capture 3D large-scale features while affordably resolving the wall-normal structure of near-wall flow is demonstrated.

[1] R. C. Schmidt, A. R. Kerstein, R. McDermott, Comput. Methods Appl. Mech. Eng. **199**, 865-880 (2010).
[2] A. R. Kerstein, Lect. Notes Phys. **756**, 291-333 (2009).

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