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Computational modeling of scalar transport and buoyancy effects in turbulent flows using ODTLES ALAN KERSTEIN, Consultant, CHRISTOPH GLAWE, HEIKO SCHMIDT, BTU Cottbus, RUPERT KLEIN, Freie Universitat Berlin, ESTEBAN GONZALEZ-JUEZ, Combustion Science and Engineering, Inc., RODNEY SCHMIDT, Sandia National Laboratories — ODTLES is a stochastic model for turbulent flow simulation consisting of a lattice-work of instantiations of the one-dimensional-turbulence (ODT) model, each of which is time advanced on a 1D domain with full spatial and temporal resolution. Collectively they form a 3D coarse mesh on which 3D flow is captured by coupling the 1D domains so as to obtain a formulation that reduces to direct numerical simulation (DNS) and conventional large-eddy simulation in the appropriate limits. The advantage of ODTLES relative to the latter is the built-in resolution of small scales where needed (near walls, across buoyancy jumps, etc.) at lower cost than resolving them using 3D DNS. A recent formulation targeting confined flow [1] is generalized to incorporate scalar fields and buoyancy effects. The generalized formulation, illustrative applications, and planned future development are described.

[1] E. D. Gonzalez-Juez, R. C. Schmidt, A. R. Kerstein, Phys. Fluids **23**, 125102 (2011).

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