

Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

A framework for cost-effective modeling of nonlocal eddy diffusivities¹ JESSIE LIU, HANNAH WILLIAMS, ALI MANI, Stanford University — New techniques, such as the Macroscopic Forcing Method (MFM) (Mani and Park (2019), arXiv:1905.08342), have quantified nonlocality as a missing ingredient in Reynolds-averaged Navier-Stokes (RANS) models. In contrast with the commonly used Boussinesq approximation, a purely local approximation, nonlocality allows an unclosed term at a given point to depend on mean field quantities at all points in space and at previous times. However, this dependence also causes implementation of nonlocality to be computationally expensive and impractical for many applications. Using passive scalar transport as an example, we present a framework for cost-effective modeling of spatiotemporal nonlocality with extension to inhomogeneous flows.

¹Supported by NSF and the Burt and Deedee McMurtry Stanford Graduate Fellowship

Jessie Liu
Stanford University

Date submitted: 10 Aug 2020

Electronic form version 1.4