Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Flavours of Stratified Shear Flows: Algorithmic Detection HESAM SALEHIPOUR, Woods Hole Oceanographic Institution, TOM EAVES, University of British Columbia — It remains unknown how to relate our understanding of turbulent mixing in stratified shear flows (based on direct numerical simulation (DNS)) to oceanic measurements of 1D profiles of density and velocity. In particular, there are various pathways to turbulence in stratified shear flows which behave in categorically different ways, but a method of distinguishing between these pathways in 1D microstructure measurements has yet to be proposed. Recently, a coordinate-free algorithmic classification scheme for the nonlinear states which result from the saturation of each instability has been proposed by Eaves and Balmforth (JFM 860, 2019), and hence is ideally suited for examining 1D profiles. This study was mostly restricted to relatively idealised steady, 2D flows; however, some aspects of this scheme were seen to carry over to non-steady, 3D flows after coarse-graining of the flow profiles. In this talk, we will investigate when the classification scheme works for realistic flows. In particular, we shall examine a large number of 1D profiles obtained from DNS of both Kelvin–Helmholtz and Holmboe instabilities to investigate the performance of this scheme over a large range of Reynolds and Richardson numbers, in addition to the type of instability and the 'age of the flow.

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Date submitted: 01 Aug 2019 Electronic form version 1.4