Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Calibration of Discrete Random Walk (DRW) Model via G.I Taylor's Dispersion Theory[1] TEYMOUR JAVAHERCHI, ALBERTO ALISEDA, University of Washington — Prediction of particle dispersion in turbulent flows is still an important challenge with many applications to environmental, as well as industrial, fluid mechanics. Several models of dispersion have been developed to predict particle trajectories and their relative velocities, in combination with a RANS-based simulation of the background flow. The interaction of the particles with the velocity fluctuations at different turbulent scales represents a significant difficulty in generalizing the models to the wide range of flows where they are used. We focus our attention on the Discrete Random Walk (DRW) model applied to flow in a channel, particularly to the selection of eddies lifetimes as realizations of a Poisson distribution with a mean value proportional to κ/ϵ. We present a general method to determine the constant of this proportionality by matching the DRW model dispersion predictions for fluid element and particle dispersion to G.I Taylor's classical dispersion theory. This model parameter is critical to the magnitude of predicted dispersion. A case study of its influence on sedimentation of suspended particles in a tidal channel with an array of Marine Hydrokinetic (MHK) turbines highlights the dependency of results on this time scale parameter.

[1]Support from US DOE through the Northwest National Marine Renewable Energy Center, a UW-OSU partnership.

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Date submitted: 08 Aug 2012 Electronic form version 1.4