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On the structure of turbulence dissipation rate under unsteady breaking waves[1] MORTEZA DERAKHTI, JAMES KIRBY, Univ of Delaware — During the last decade, extensive laboratory and field measurements have been conducted for the estimation and parameterization of the turbulence dissipation rate under unsteady breaking waves, showing a large amount of scatter depending on the selected estimation, type and scale of the considered breaking waves. To further elucidate the physical processes involved in turbulence generation and dissipation mechanisms, Derakhti & Kirby, JFM, (2014) examined shear- and bubble-induced dissipation. They used a 3D VOF-based Navier-Stokes solver extended to incorporate entrained bubble populations using an Eulerian-Eulerian formulation for a poly-disperse bubble phase, and found that the total bubble-induced dissipation accounts for more than 50% of the total dissipation in the breaking region (the results were presented at DFD13, Abstract 001799). In this presentation, we will examine the 3D distribution of breaking-induced turbulent kinetic energy and dissipation rate during the active breaking period. The role of breaking-induced vortical structures in the transport of turbulent motions will be addressed as well. Finally, the accuracy of the available analytic scaling relations of the intensity and depth dependence of wave breaking turbulence dissipation rate will be discussed.

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