Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

**Numerical study of wind over breaking waves and generation of spume droplets.** ZIXUAN YANG, Univ of Minnesota - Twin Cities , SHUAI TANG, YU-HONG DONG, Shanghai Institute of Applied Mathematics and Mechanics, Shanghai University, LIAN SHEN, Univ of Minnesota - Twin Cities — We present direct numerical simulation (DNS) results on wind over breaking waves. The air and water are simulated as a coherent system. The air-water interface is captured using a coupled level-set and volume-of-fluid method. The initial condition for the simulation is fully-developed wind turbulence over strongly-forced steep waves. Because wave breaking is an unsteady process, we use ensemble averaging of a large number of runs to obtain turbulence statistics. The generation and transport of spume droplets during wave breaking is also simulated. The trajectories of sea spray droplets are tracked using a Lagrangian particle tracking method. The generation of droplets is captured using a kinematic criterion based on the relative velocity of fluid particles of water with respect to the wave phase speed. From the simulation, we observe that the wave plunging generates a large vortex in air, which makes an important contribution to the suspension of sea spray droplets.

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Date submitted: 31 Jul 2017 Electronic form version 1.4