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Numerical study of airflow over breaking waves. ZIXUAN YANG, LIAN SHEN, Univ of Minnesota - Twin Cities — We present direct numerical simulation (DNS) results on airflow over breaking waves. Air and water are simulated as a coherent system. The initial condition for the simulation is a fully-developed turbulent airflow over strongly-forced steep waves. The airflow is driven by a shear stress at the top. The effects of the initial wave steepness and wave age are studied systematically. Because wave breaking is an unsteady process, we use ensemble averaging of a large number of runs to obtain turbulent statistics. Simulation results show that the airflow above does not see the wave trough during wave breaking. Vortex structures at different stages of wave breaking are analyzed based on a linear stochastic estimation method. It is found that the wave breaking alters the pattern of vortex structures.

Zixuan Yang
Univ of Minnesota - Twin Cities

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