Abstract Submitted
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A study of the ocean spray effect on the vertical transport of momentum with a multi-fluid-type model under high-wind conditions of a hurricane[1] YEVGENII RASTIGEJEV, North Carolina AT State University, SERGEY A. SUSLOV, Swinburne University of Technology, Australia — In the present work we have developed an Eulerian multi-fluid-type mathematical model to describe a marine atmospheric boundary layer (MABL) laden with ocean spray. The model employs a multi-phase variable density E-epsilon turbulence closure and considers spray as a continuous medium interacting with the gas phase. The ensemble averaged conservation equations for mass, momentum and turbulent kinetic energy are formulated separately for the gas and liquid phases. The multi-fluid approach allows us to describe turbulent air-spray interaction consistently and accurately in contrast to previously used mixture-type models. Particularly, this approach enables us to account for the influence of the droplets on the turbulence intensity in the gaseous phase due to inter-facial momentum transfer in addition to the gravitational suppression of the turbulent intensity by the spray. The numerical and asymptotic analysis of the MABL with the new multi-fluid model demonstrate that the model predicts significantly different vertical distributions of spray density and characteristics of the turbulent flow especially for intermediate and large droplets compared with more conventional mixture-type models.

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