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Numerical study of ship airwake characteristics immersed in atmospheric boundary-layer flow[1] REGIS THEDIN, MICHAEL KINZEL, SVEN SCHMITZ, The Pennsylvania State University — Helicopter pilot workload is known to increase substantially in the vicinity of a ship flight deck due to the unsteady flowfield past the superstructure. In this work, the influence of atmospheric turbulence on a ship airwake is investigated. A ship geometry representing the Simple Frigate Shape 2 is immersed into a Large-Eddy-Simulation-resolved Atmospheric Boundary Layer (ABL). Specifically, we aim in identifying the fundamental topology differences between a uniform-inflow model of the incoming wind and those representative of a neutral atmospheric stability state. Thus, airwake characteristics due to a shear-driven ABL are evaluated and compared. Differences in the energy content of the airwakes are identified and discussed. The framework being developed allows for future coupling of flight dynamic models of helicopters to investigate flight envelope testing. Hence, this work represents the first step towards the goal of identifying the effects a modified airwake due to the atmospheric turbulence imposes on the handling of a helicopter and pilot workload.

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