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Aerodynamic Assessment of Cross-Wind Airwake Characteristics at Ship Helodeck: A Simplified Approach SHRISH SHUKLA¹, S. N. SINGH², S. S. SINHA³, Indian Institute of Technology Delhi, R. VIJAYAKUMAR, Indian Institute of Technology Madras — The combined ship-helicopter operation nearby small naval vessels has historically been one of the most challenging tasks. The complexity of this task primarily depends on the ship superstructure, helicopter aerodynamics, and cross-wind conditions. An early assessment of the overall airwake characteristics is one of the challenging tasks. The First-Of-Class Flying Trials are one of the most common methods to assess the resultant flow characterises over helodeck. These trials are conducted post-construction of the ship and mainly based on qualitative ratings of the test pilot. Also, a wide range of wind conditions cannot be covered, and the scope of further design modification is limited. Thus, there is a strong need to assess the impact of cross-wind conditions on the ship helodeck at the initial design stages. We present an early-stage simplified approach to estimate the aerodynamic impact of cross-winds over ship helodeck with reasonable accuracy. A Reynolds-averaged-Navier-Stokes based parametric analysis has been conducted for six cross-wind conditions to understand the cross-wind phenomena over a simplified frigate ship helodeck. The paper reports the cross-wind airwake assessment based on the criteria set developed by mean velocity gradients and turbulence intensity.

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