Wind Speed Profile Comparison -- 12-Fan WOW Vs. Category 5 Hurricane Conditions

The Saffir–Simpson scale for categorizing hurricane intensity and damage potential is associated with 1-min sustained wind speeds. For structural engineering purposes, the ASCE 7 Standard\(^1\) defines these 1-min speeds as speeds at 33ft over open water. The technical note by Simiu et al.\(^2\) provides a methodology for estimating the ratio of peak 3-s wind speeds at 10 m over open-terrain exposure—the speeds used in the ASCE 7 wind map—to 1-min speeds at 10 m above open water. The 12-fan Wall of Wind (WOW) at the Florida International University (FIU) can generate wind speeds representing Category 5 hurricane conditions for testing low rise structures for suburban terrain exposure. Using the methodology given in Simiu et al., Category 5 Saffir–Simpson scale wind speed (≥157 mph 1-min speed at 33ft above open water) has been used to estimate 3-s wind speed profile for suburban terrain exposure. This wind speed profile, representing Category 5 hurricane condition, is compared to the WOW profile for suburban terrain in Fig. 1. Non-dimensional wind speed profile comparison, showing the simulation of atmospheric boundary layer profile based on ASCE 7 suburban terrain power law exponent, is given in Fig. 2.

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