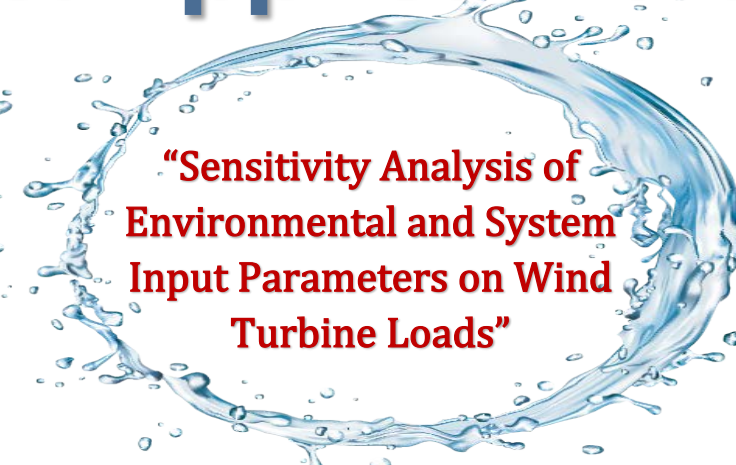


Center for Environmental & Applied Fluid Mechanics



“Sensitivity Analysis of Environmental and System Input Parameters on Wind Turbine Loads”

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Abstract: Wind turbine loads are influenced by a complex interplay of environmental and system parameters, with atmospheric conditions playing a pivotal role. Variability or uncertainty in these factors can significantly impact measured loads, making it critical to identify which parameters have the greatest influence. Understanding these sensitivities provides valuable insights for refining measurement campaigns, improving uncertainty assessments, and enhancing analysis studies.



This presentation explores a series of sensitivity analyses aimed at identifying key input parameters that drive uncertainty in turbine loads for both land-based and offshore systems. Using elementary effects methods, we quantify how variability in wind inflow, wave excitation, and system properties propagates through turbine simulations across a range of operational and environmental conditions. These findings can help inform probabilistic design approaches, improve site suitability analyses, develop surrogate models, and pinpoint critical parameters for measurement and validation campaigns, ultimately contributing to more reliable and efficient wind energy systems.

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April 8, 2025 ✦ 3:00 PM ✦ Hodson 210

