Environmental and Water Resources Engineering, and Center for Water and the Environment Seminar Series Presents:

TEXAS

Thursday, November 13th 2025, 3:30-4:30 pm, ECJ 1.324

Zoom Link: https://utexas.zoom.us/j/81263061920

Wave-turbulence decomposition in the surf zone

Po-Chen Chen, PhD Candidate

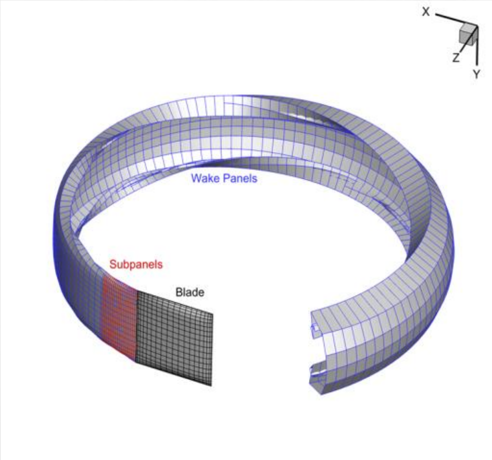
B.S. and M.S. Engineering Science and Ocean Engineering, National Taiwan University, Taiwan
Advisor: Dr. Blair Johnson

The surf zone, where waves begin to break, is one of the most energetic coastal regions. Breaking waves intermittently inject momentum into the water column, resulting in superposition of coherent wave-induced motions and breaking wave-generated turbulence. As wave energy propagates shoreward, orbital motions persist due to waves, while turbulence cascades from large to small scales and interacts with the seabed. These two components, wave-induced motions and turbulence, often overlap in both spatial and temporal scales, making it difficult to distinguish their individual contributions. Accurate separation of wave and turbulence signals is therefore critical for understanding near-bed sediment transport, estimating turbulence characteristics such as turbulent kinetic energy and dissipation rate, and improving parameterizations in bottom boundary layer models.

Study of flow around a vertical axis water turbine with a 3D panel

Shibo Peng, PhD Student

M.S. Civil Engineering, KTH Royal Institute of Technology, Sweden | B.S. Architectural Engineering, City University of Hong Kong, HKSAR
Advisor: Dr. Spyros Kinnas



PROPCAV (PROPeller CAVitation) is a robust numerical tool developed by the Ocean Engineering Group for solving the 3-D unsteady flow, including the effects of cavitation, around propellers based on the boundary element or panel method. It provides both steady wake alignment (Full Wake Alignment, FWA) and unsteady wake alignment to predict the wake development of propeller blades. PROPCAV is currently extended to address the performance of vertical axis wind/water turbines (VAWTs), in which the turbine blades rotate around the vertical axis. Compared with helical propellers, a challenge in studying VAWT is that its blades will keep intersecting with their own wake while rotating. Therefore, proper wake modeling is the key to accessing the turbine performance. Our study applies PROPCAV to model the wake of a VAWT and to investigate the inviscid flow around both stationery and rotating hydrofoils. The results from our method are shown to compare well with those from Reynolds-Averaged Navier-Stokes (RANS) simulations. Given that boundary element methods reduce the computational domain from volume to boundaries, PROPCAV exhibits a significantly faster computational speed over finite volume methods.