



## ICTS Fluid Dynamics Seminar

- Title** : Bridging the scales: A Modeling Framework for the Marine Atmospheric Boundary Layer with Applications to Offshore Wind Energy
- Speaker** : Aditya Aiyer (Lehigh University, United States)
- Date** : Monday, 13 January 2025
- Time** : 11:30 AM (IST)
- Abstract** : Wind-wave interactions are central to quantifying momentum transport at the air-sea interface and are critical to developing offshore renewable energy. Significant knowledge gaps exist regarding the coupling between waves, the atmospheric boundary layer, and their effects on offshore wind turbines. To this end, I will discuss a modeling framework for the marine atmospheric boundary layer that quantifies small-scale effects through physics-based models and couples them to high-fidelity simulations of large-scale flows. I will present a new “wall” modeling approach that overcomes these limitations and accurately predicts the wind-wave momentum transfer by modeling the pressure-based surface drag on the wind due to simple wavefields. Further, the model can be extended to realistic oceanic conditions using a dynamic procedure that calculates the momentum transfer due to waves unresolved in flow simulations based on a self-consistency condition of the total drag. Finally, I will discuss the application of the dynamic wave model to offshore wind farm simulations.
- Venue** : Emmy Noether Seminar Room  
Zoom Link: <https://icts-res-in.zoom.us/j/91680208381?pwd=nsAzJ73zSzDEJFbqzFqwtOaLyL4M24.1>  
Meeting ID: 916 8020 8381  
Passcode: 594105