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High Speed PIV of Breaking Waves on Both Sides of the Air-Water Interface A.H. TECHET, A.K. MCDONALD, MIT — High speed particle image velocimetry (PIV) is performed on plunging and spilling breakers to capture physics on both the air and water side of the free surface. Wave breaking on the surface of the ocean results in significant transfer of mass, momentum, heat and energy across the air-sea interface. In order to further understand the physics associated with wave breaking and to generate accurate models, experiments and simulations that consider the physics in both the air and water are necessary. Here, high speed PIV (500 fps) is used to capture the flow field in both the air and water. Reynolds numbers of the waves are on the order of $Re = 9x10^4$ to $2x10^6$, where $Re = \frac{\rho\sqrt{g\lambda^3}}{\mu}$, ρ is fluid density, μ is fluid dynamic viscosity, g is gravity, and λ is the characteristic wavelength of the breaking wave upstream of the breaking event. Isopropyl alcohol (IPA) was mixed with the distilled water in the tank to reduce suface tension an thus achieve plunging breakers in the small tank on this scale. Experiments can be compared qualitatively with numerical simulations by Hendrickson (2004). This talk will present data from the experiments and discuss the experimental issues relating to measurements on the air-side of the air-sea interface. *References* **Hendrickson KL** (2004) Navier-Stokes Simulations of Steep Breaking Water Waves with a Coupled Air- Water Interface. *PhD Thesis* Massachusetts Institute of Technology.

Alexandra Techet
MIT

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