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Modeling the damping rates of surface water waves GIRISH KUMAR RAJAN, DIANE HENDERSON, The Pennsylvania State University — In this work, we investigate linear damping rates of surface water waves in both laboratory and ocean settings. We formulate two models that generalize previous work to include the effects of air and two interfacial conditions. The first is a two-fluid model (representing air and water) with a monomolecular film at the interface. The second is a three-fluid model that has a Newtonian fluid with variable, but thin, thickness at the interface of the water and air. Limiting cases of these models reduce to expressions that agree with previously published results. We compare predictions of damping rates to both laboratory and oceanographic data. These models have been developed for a general fluid system and may thus be used for fluids other than air and water, with any general fluid-film at the interface, whose properties are known.

Girish Kumar Rajan
The Pennsylvania State University

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