

The Department of Civil and Environmental Engineering at the University of Houston presents...

CIVE 6111 Graduate Seminar

Flow Kinematics, Turbulence, and Air Entrainment under Laboratory Breaking Waves



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2:45pm-3:45pm

Classroom Business Building (CBB) – Room 106

Abstract

Laboratory measurements of velocity fields and void fraction under plunging and spilling breaking waves are presented. Modified particle image velocimetry (PIV) was used to quantify the flow kinematics and turbulence while fiber optic reflectometer (FOR) was used to quantify the breaking-induced air entrainment inside the aerated region of the breakers. The mass flux, momentum flux, kinetic energy, potential energy, and energy dissipation were computed and compared with and without the void fraction being accounted for. The results show that all the mean and turbulence properties related to the air-water mixture are considerably overestimated unless void fraction is accounted for. Bubble-size distributions are also determined based on combined measurements of velocity and bubble residence time. Some kinematic and dynamic properties of the breakers are discussed and compared, and so as applicability of the equipartition assumption before and during the breaking process.

Bio

Kuang-An Chang is a Professor at the Zachry Department of Civil and Environmental Engineering, a Professor at the Department of Ocean Engineering, and Director of the Environmental Fluid Dynamics Laboratory at Texas A&M University. He received his BS degree from National Taiwan University in 1991, and MS and PhD degrees from Cornell University in 1994 and 1999. His research interest is in coastal and ocean engineering, environmental fluid mechanics, and experimental techniques applying digital imaging and optics. He was a Visiting Associate Professor at Cornell University, a Visiting Professor at Kyoto University, and a Visiting Researcher at the Central Research Institute of Electric Power Industry in Japan. He is a fellow of ASCE, and currently serves as an Associate Editor for the *ASCE Journal of Engineering Mechanics* and the *Coastal Engineering Journal*, and as an editorial board member of *Applied Ocean Research*.