Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Quantification of air entrainment in a turbulent breaker from Bubble Image Velocimetry (BIV) data JAVIER RODRIGUEZ-RODRIGUEZ, Carlos III University of Madrid, Spain, JUAN LASHERAS, University of California, San Diego — One of the most difficult to quantify features of free surface turbulent flows is the amount of air that they engulf. Among other reasons, the large void fractions found in these flows preclude the application of many diagnostic techniques commonly used in fluid mechanics. In this work, we investigate the possibility of taking advantage of the large void fraction found in a turbulent breaker to simultaneously characterize the velocity field and the flux of air entrained across the mean free surface. To that end, we use a technique known as Bubble Image Velocimetry (BIV) that consists of applying standard PIV algorithms to a sequence of images of a bubble laden flow. Under certain conditions, that will be explained in this talk, the bubbles follow the motion of the large turbulent structures that are the main responsible for the entrainment of air bubbles. Thus tracking the motion of the bubbles, and measuring their number and volume distribution, it is possible to evaluate the flux of air across the mean free surface. The results obtained with this method are compared with those found in the literature that were acquired with fiber-optic void fraction probes. Supported by the ONR under contract N00014-05-1-0121 and by the Spanish Government through grant: DPI2011-28356-C03-02.

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Date submitted: 07 Aug 2012 Electronic form version 1.4