Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Empirical mode decomposition profilometry: small scale capabilities and comparison to Fourier Transform Profilometry GUILLAUME LAGUBEAU, Departamento de Fisica, Universidad de Santiago de Chile, PABLO COBELLI, Departamento de Fisica, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires and IFIBA, TOMASZ BOBINSKI, PMMH-ESPCI, AGNES MAUREL, Institut Langevin, VINCENT PAGNEUX, Laboratoire d'Acoustique de l'Universite du Maine, PHILIPPE PETITJEANS, PMMH-ESPCI — Fringe projection profilometry is an instrument of choice for the instantaneous measurement of the full height map of a free-surface. It is useful to capture interfacial phenomena such as droplet impact and propagation of water waves. We present the Empirical Mode Decomposition Profilometry (EMDP) for the analysis of fringe projection profilometry images. It is based on an iterative filter, using empirical mode decomposition, that is free of spatial filtering and adapted for surfaces characterized by a broadband spectrum of deformation. Examples of such surfaces can be found in nonlinear wave interaction regimes such as wave turbulence in gravity-capillary water waves. We show both numerically and experimentally that using EMDP improves strongly the profilometry small scale capabilities compared to traditionally used Fourier Transform Profilometry. Moreover, the height reconstruction distortion is much lower: the reconstructed height field is now both spectrally and statistically accurate.

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Date submitted: 16 Jul 2015 Electronic form version 1.4