

Weekly CEA FM Seminar: Spring 2015



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& Applied Fluid Mechanics

Date: **Friday, March 27, 2015**
Time: 11:00 AM
Location: Gilman Hall # 132
Speaker: **Prof. Pierre Lubin** (Université de Bordeaux)
Title: ***"Numerical Simulations of the Three-Dimensional
Flow Structures under Breaking Waves"***

Abstract

Numerical simulation of breaking waves is still a very challenging aim to achieve since small interface deformations, air entrainment and vorticity generation are involved during the early stage of the breaking of the wave. A high mesh grid resolution is then required to capture these complex mechanisms responsible for the start of the breaking, leading to very time consuming simulations. The scope of this talk is to show the results obtained for simulating breaking waves, by solving the Navier-Stokes equations in air and water. We use a university CFD software (Thétis) developed at the TREFLE laboratory, which has already been shown to give accurate results for coastal applications. Performing numerical simulations of breaking waves requires a large number of mesh grid nodes, robust and accurate numerical methods and long CPU time calculations to compute the hydrodynamics from the largest to the smallest length and time scales. Recent progress in computational capacities allowed us to run fine three-dimensional simulations giving us the opportunity to observe for the first time fine vortex filaments generated during the early stage of the wave breaking phenomenon. We will show the capacity (and the limitations!) of the numerical model to simulate bubbles and droplets generation during the breaking process.