Abstract Submitted for the DFD19 Meeting of The American Physical Society

Generation of Water Waves by Underwater Multi-Point Action¹ LEONARDO GORDILLO, JUAN F. MARÍN, ISIS VIVANCO, Departamento Universidad de Santiago de Chile, Santiago, Chile, BRUCE de Física. CARTWRIGHT², The University of Newcastle, Callaghan, NSW 2308, Australia — Wave generation in channels is usually achieved through wavemakers (moving paddles) acting on the surface of water. Although practical for this purpose, wavemakers have issues: they perform poorly in the generation of long waves and create evanescent waves in their vicinity. In this talk, we introduce a framework for wave generation through the action of an underwater multi-point mechanism. We analyze the linear response of waves in a uniform channel in terms of the frequency and wavelength of the bottom action. The system behaves as a long-pass filter in space and a high-pass filter in time with a sharp resonance limited by viscosity. The framework naturally solves the problem of the performance for long waves and reduces evanescent waves to thin boundary layers at the bottom. We also show that a proper synchronization of an orbital motion on the bottom can produce waves that mimic deep water waves with great accuracy. This last feature has been proved to be useful and efficient to study fluid-structure interaction in simulations based on smoothed-particle hydrodynamics.

¹Funded by Fondecyt 11170700, Australian Research Council-Linkage Project LP160100391 and USA1899-Vridei 041931YZ-PAP. ²Pacific Engineering Systems International, Glebe, NSW 2037, Australia

> Leonardo Gordillo Departamento de Física, Universidad de Santiago de Chile, Santiago, Chile

Date submitted: 01 Aug 2019

Electronic form version 1.4