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Harmonic and Subharmonic Surface Wave Dynamics in Horizontally Vibrated Rectangular Containers¹ JEFF PORTER, CARLOS LOPEZ, ANA LAVERON, Universidad Politecnica de Madrid, E.T.S.I. Aeronauticos — We discuss the theoretical background and preliminary results from a recently initiated experimental study of surface wave dynamics in open, horizontally vibrated containers. Recent theory by Varas and Vega (J. Fluid Mech. 579, 2007) indicates how rich this system can be. The container walls, acting as wavemakers, generate harmonic surface waves that may be localized near these walls or extended; a multiplicity of states leads to hysteresis depending strongly on the Bond number and container size. Additionally, the horizontally vibrated walls generate an oscillatory bulk flow, and hence an oscillatory normal pressure gradient at the free surface, whose effect is analogous to Faraday (vertical) excitation and leads, for sufficient amplitude, to subharmonic instability. We investigate this mechanism, and a range of competing instabilities and mode interactions, in low viscosity silicone oil (DC 200/10) for frequencies of 10-50 Hz.

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