# Control of water waves system and fluid-structure interaction

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**Abstract**

In this talk, we introduce two topics related to water waves system.

The first topic is on a boundary control problem of the small-amplitude water waves system in a water tank, in particular, with a wave maker. The wave maker acts on one lateral boundary, by imposing the acceleration of the fluid in the horizontal direction, as a scalar input signal. We introduce the Dirichlet to Neumann and Neumann to Neumann maps, asscociated to the certain edges of the domain, so that the system reduces to a well-posed linear control system. Then we consider the stabilizability issue on the gravity and gravity-capillary waves. It turns out that, in both cases, there exists a feedback functional, such that the corresponding control system is strongly stable. Moreover, we study the asymptotic behaviour of the above system in *shallow water regime*, i.e. the horizontal scale of the domain is much larger than the typical water depth. We prove that the solution of the water waves system converges to the solution of the one dimensional wave equation with Neumann boundary control, when taking the shallowness limit.

Another interesting topic is a rigid object, constrained to move vertically, floating in shallow water with an external force applied from its bottom. We first derive the governing equations for this control system and formulate it into a first-order evolution system. Then we establish the well-posedness of the linearized control model and study its controllability and stabilizability properties. We show that this wave-structure system is not exactly controllable, while the approximately controllability holds in some special cases.

Part of this work is in collaboration with M. Tucsnak (Bordeaux) and G. Weiss (Tel Aviv).

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