

# Boundary controllability of a system modelling a partially immersed obstacle

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In this talk, we address the problem of boundary controllability for the one-dimensional nonlinear shallow water system, describing the free surface flow of water as well as the flow under a fixed gate structure (see Figure 1). The system of differential equations considered can be interpreted as a simplified model of a particular type of wave energy device converter called oscillating water column [1].

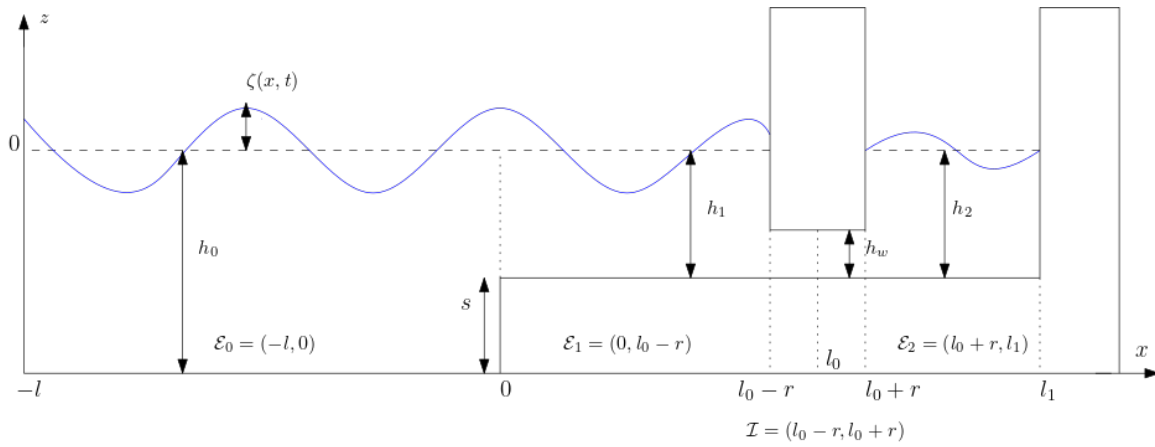


FIGURE 1 – Configuration.

The physical requirements naturally lead to the problem of exact controllability in a prescribed region [2]. In particular, we use the concept of nodal profile controllability in which at a given point (the node) time-dependent profiles for the states are required to be reachable by boundary controls. By rewriting the system into a hyperbolic system with nonlocal boundary conditions, we at first establish the semi-global classical solutions of the system, then get the local controllability and nodal profile using a constructive method. In addition, based on this constructive process, we provide an algorithmic concept to calculate the required boundary control function for generating a solution for solving these control problem.

## Références

- [1] E. BOCCHI, J. HE, AND G. VERGARA-HERMOSILLA, *Modelling and simulation of a wave energy converter*, to appear in ESAIM :Proceedings and Surveys.
- [2] G. VERGARA-HERMOSILLA, G. LEUGERING, AND Y. WANG, *Boundary controllability of a system modelling a partially immersed obstacle*, submitted.