Study of a fluid-structure interaction model

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In this talk, we consider a Fluid-Structure (FS) model coupling the fluid motion modeled by the incompressible Navier-Stokes equations in a 2D channel with mixed boundary conditions, and a structure composed by a solid cylinder and a deformable tail that is governed by a damped 1D Euler-Bernoulli beam equation. The elastic part is assumed to be clamped at one end and free at the other one.

During this talk, we will first describe precisely the model and then show the existence and uniquiness of a strong solution. We highlight that although we follow a similar approach to the one used in [1, 2], we will emphasize in the steps where it was necessary to proceed in a different way. In addition, we shall also present some numerical simulations.

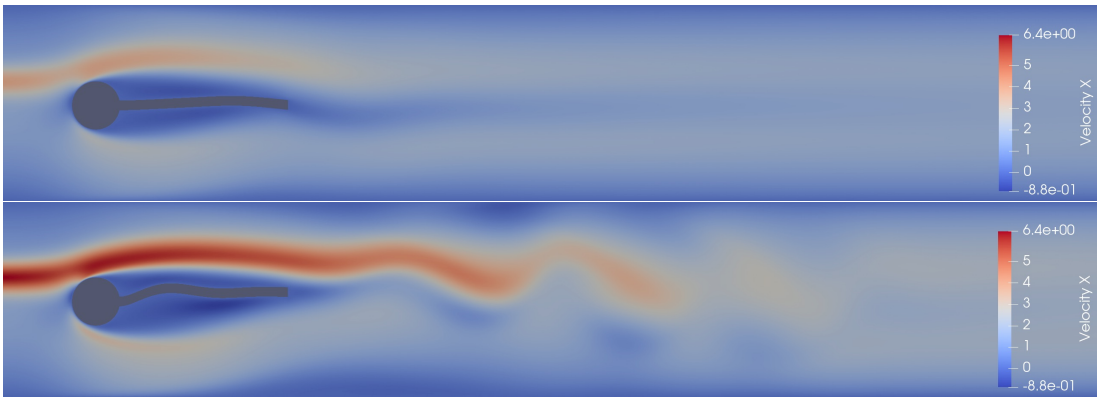

FIGURE 1 – Velocity profile in horizontal direction at $t = 0.5[s]$ and $t = 1.0[s]$.

[1] M. Fournié, M. Ndiaye, J.-P. Raymond. *Feedback stabilization of a two-dimensional fluid-structure interaction system with mixed boundary conditions.* SIAM Journal on Control and Optimization, **57(5)**, 3322–3359, 2019. doi :10.1137/18M1172405.

[2] D. Maity, J.-P. Raymond, A. Roy. *Maximal-in-time existence and uniqueness of strong solution of a 3d fluid-structure interaction model.* SIAM Journal on Mathematical Analysis, **52(6)**, 6338–6378, 2020. doi :10.1137/18M1178451.

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