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# Stochastic models of some bistable flows

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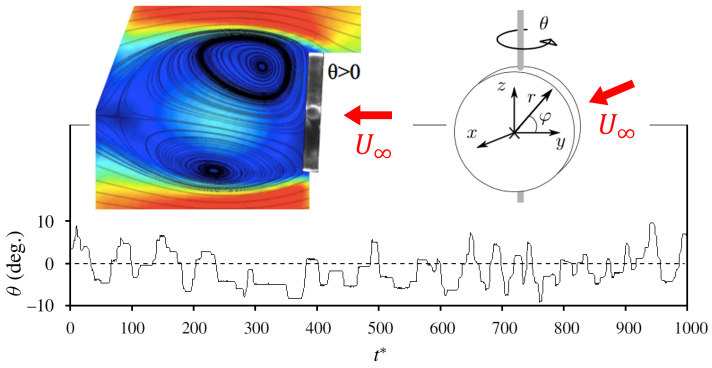
LMFL Fluid Mechanics Webinar Link

**Abstract**

Multistable fluid systems are characterized by rich dynamics, where either turbulence or an external noise can induce random transitions between the different attractors, for example in turbulent convection, climate change and bluff body wakes. In this seminar, I will present very reduced order models that attempt to describe the stochastic dynamics of some bistable flows. First, I will show two examples of turbulent flows where a reduced model is proposed and identified from experimental measurements: (i) a rigid disk facing the incoming flow and free to rotate about one of its diameters, leading to fluid-structure interaction between the inclination of the disk and the deflection of the turbulent wake; (ii) a stalled airfoil exhibiting bistability between attached and detached flow states in a narrow range of angles of attack. Second, I will show how the same kind of reduced model can be rigorously derived for laminar flows forced by a weak noise close to a steady symmetry-breaking bifurcation. The method, based on a weaky nonlinear analysis, will be illustrated with (iii) a sudden expansion. Collaborators: (i) O. Cadot; (ii) I. Kharsansky Atallah L. Pastur; (iii) Y.M. Ducimetière and F. Gallaire.

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