LadHyX Seminar – September 8, 10:45, – LadHyX Library

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Generic instabilities of bluff body wake flows and the coincidence of local bifurcations.

This presentation will be divided into two parts. In the first part, I will describe some of the recent results obtained on the manipulation of simple 3D bluff body wake flows, in particular with respect to the bi-stable dynamics sometimes observed in these flow confirgurations. This dynamics is characterised by the intermittent transitions between two wake flow states, each asymmetric in average. These asymmetric wake flow states are associated with an increase of the drag of the body, and blowing experiments at the rear of academic models of ground vehicles have evaluated the control authority of this type of actuator. From a more fundamental point of view, this type of flows results from the succession of two local bifurcations with increasing Reynolds number: one super-critical Hopf bifurcation and another super-critical pitchfork bifurcation. This scenario is also observed in the so-called "fluidic pinball" configuration, formed by three cylinders arranged on the vertices of an equilateral triangle, in cross-flow. In this configuration, we observed the coincidence, for the same value of the Reynolds number, of two local bifurcations, one on the symmetrical (unstable) basic flow state, the other on the symmetrical limit cycle, also unstable. The reason for such a non-generic coincidence will be described in the second part of this presentation.