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A 2D pendulum submitted to an incoming flow: drag acting like gravity and new instabilities ANDREA FANI, Laboratoire Dieudonne, Universite de Nice Sophia-Antipolis, Nice, France and LFMI, EPFL, Lausanne, Switzerland, FRANCOIS GALLAIRE, LFMI, EPFL, Lausanne, Switzerland — Flow induced oscillations of slender bodies facing an incoming flow are relevant in a large number of engineering applications, such as the design of tubular structures of offshore platforms, heat exchangers and energy harvesting. Numerical simulations and experiments available in literature often consider a circular cylinder in an uniform flow which can move only transversally with respect to the flow direction. In a recent work Semin *et al.* (*JFM*, 2011) studied a tethered 2D cylinder strongly confined between two parallel plane walls. It is shown that confinement alters significantly the flow dynamics, with a new instability, denoted confinement induced vibration (CIV), which occur at a Reynolds number much lower than the vortex induced vibration (VIV) critical one. In the present work we characterize the instability scenario of a confined tethered cylinder by means of a global stability analysis of the fluid-structure problem. In strongly confined channels, a periodic unstable mode, related to CIV vibrations, is observed, while for moderated confinement a new steady diverging instability is founded.

Andrea Fani
Laboratoire Dieudonne, Universite de Nice Sophia-Antipolis, Nice, France

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