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Transverse vortex-induced vibrations of a prolate spheroid ALVARO SANCHEZ RUIZ, Flying Whales / IMFT, REMI BOURGUET, IMFT / CNRS, GUILLAUME MARTINAT, Flying Whales — A prolate spheroid of aspect ratio 6:1 can be regarded as a simplified model of the hull of an aeronautical or underwater vehicle. From a fundamental perspective, it represents an intermediate geometry between a sphere and an infinite circular cylinder, which have often served as paradigms to study bluff body wakes and flow-induced vibrations. When a rigidly mounted, prolate spheroid is placed in a cross-current, i.e. a flow normal to its long axis, previous studies have shown that its unsteady wake is characterized by the formation of large-scale hairpin vortices, which result in fluctuations of fluid forces. The case where the spheroid is elastically mounted and the possible occurrence of flow-induced responses of the body remain to be explored. This is the object of the present work where the spheroid is free to vibrate in the transverse direction. On the basis of direct numerical simulations, the behavior of the coupled flow-structure system is examined, at Reynolds number 100, over a wide range of values of the oscillator natural frequency. Focus is placed on the emergence of vortex-induced vibrations and on the associated alteration of the flow dynamics, compared to the stationary body wake.

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