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FLOW-INDUCED SELF-SUSTAINED OSCILLATIONS IN A STRAIGHT CHANNEL WITH RIGID WALLS AND ELASTIC SUPPORTS

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Abstract. Flows between parallel-sided channels with oscillating walls are encountered in numerous and diverse problems such as lubrication, peristaltic pumps, valves, pulsating diaphragms or in aerodynamic particle focusing devices. In physiological systems, some paradigmatic examples of this kind of flow are found in the respiratory system of some insects, such as ground beetle and *Lethocerus uhleri* or in the myoelastic-aerodynamic mechanism responsible for voice production in songbirds and mammals. Flow-induced oscillations of a parallel sided channel have also been largely discussed in the context of voice production. In this context, the idealized vocal-fold models normally consider a symmetric motion of both folds, except when trying to model vocal fold unilateral paralysis, in which only one of both folds moves. This work focuses on the induced motion produced by air flowing inside a channel with rigid parallel walls, one elastically mounted and the other fixed. In our study, wall motion is therefore not imposed. The flow that forces the wall movement is produced as a consequence that one of the ends of the channel is pressurized, while the opposite end is at atmospheric pressure. The purpose of the article is to analyze the dynamics of this system combining an experimental study and an analytical approach that considers asymptotic solutions of Navier-Stokes equation with a perturbation technique.