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Sky Dancer: a chaotic system ANNE CROS, FERNANDO CASTILLO FLORES, Departamento de Física, Universidad de Guadalajara, 44430 Jalisco, México, PATRICE LE GAL, IRPHE, Technopôle de Chateau-Gombert, 13384 Marseille, France — We present the experimental study of a collapsible tube conveying an ascending air flow. An extreme of the membrane tube is mounted on the air blower exit, while the other extreme is free. The flow velocity can be varied. For low speeds – and tubes short enough – the cylinder stands up (stable state). As the velocity is increased, the system presents sporadic turbulent fluctuations, when the tube bends and rises again. As the air speed is increased again, the intermittent events become more and more frequent. Films realized in front of the system permit to observe waves that propagate in the tube. We measure that these waves have a sonic speed, confirming previous results. Moreover, films taken from the top of the system allow a quantitative characterization of the transition to chaos. By processing the images, we can reduce the evolution of the system to two states: stable (when it is raised) and chaotic (when the tube fluctuates). The histograms of unstable / stable states are coherent with an intermittent transition in the theory of chaos.

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