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Low-frequency dynamics of pressure-induced turbulent separation bubbles JULIEN WEISS, ABDELOUAHAB MOHAMMED-TAIFOUR, ARNAUD LEFLOCH, Ecole de Technologie Superieure — We experimentally investigate a pressure-induced turbulent separation bubble (TSB), which is generated on a flat test surface through a combination of adverse and favorable pressure gradients imposed on a nominally two-dimensional, incompressible, turbulent boundary layer. We probe the flow using piezo-resistive pressure transducers, MEMS shear-stress sensors, and high-speed, 2D-2C, PIV measurements. Through the use of Fourier analysis of the wall-pressure fluctuations and Proper Orthogonal Decomposition of the velocity fields, we show that this type of flow is characterized by a self-induced, low-frequency contraction and expansion - called breathing - of the TSB. The dominant Strouhal number of this motion, based on the TSB length and the incoming velocity in the potential flow, is of the order of 0.01. We compare this motion to the low-frequency dynamics observed in laminar separation bubbles (LSBs), geometry-induced TSBs, and shock-induced separated flows.

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