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Flow induced vibrations of high-frequency microcantilevers TAEJOON KOUH, Kookmin University, Boston University, SETH HODSON, VICTOR YAKHOT, KAMIL EKINCI, Boston University — Here we present a parametric study of flow induced vibrations of high-frequency microcantilevers with resonance frequencies in the range 70 kHz to 400 kHz. In the experiments, the microcantilevers are placed in a microchannel; subsequently, a known air flow rate is established through this microchannel, while the pressure drop across is monitored. The resulting transverse vibrations of the microcantilevers are monitored optically with a displacement sensitivity at the level of thermal fluctuations as a function of the air flow rate. As the flow rate is increased, we detect a sudden increase in the vibration amplitudes of the microcantilevers. In addition, the resonance frequencies and the line-widths of the microcantilevers shift as a function of the imposed flow rate. We discuss possible trigger mechanisms for the observed vibrations, including vortex shedding and turbulent fluctuations, and obtain scaling relations in terms of the experimental parameters.

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