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Direct measurements of flow and deformation of a free reed PETER BUCHAK, University of Massachusetts Amherst, JOHN BUSH, Massachusetts Institute of Technology — The free reed, responsible for producing sound in a family of air-driven musical instruments, is an example of a coupled fluid-structure system engineered to vibrate efficiently at a controllable frequency. In Western free reed instruments, a flexible metal plate is clamped at one end above a slot cut into a rigid support plate. This geometry allows a constant driving pressure to produce and sustain large-amplitude vibrations. The mechanism behind this has been discussed by several investigators. However, it has yet to be verified experimentally with direct measurements of the flow speed. We present simultaneous measurements of the reed motion and the flow speed in the downstream jet, which enable characterization of the relationship between the finite-amplitude deformation of the reed and the flow.

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