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Transverse acoustic forcing of a round hydrodynamically self-excited jet[1] ABHIJIT KUMAR KUSHWAHA, Hong Kong Univ of Sci Tech, MAREK MAZUR, NICHOLAS WORTH, JAMES DAWSON, Norwegian Univ of Sci Tech, LARRY K.B. LI, Hong Kong Univ of Sci Tech — Hydrodynamically self-excited jets can readily synchronize with longitudinal acoustic forcing, but their response to transverse acoustic forcing is less clear. In this experimental study, we apply transverse acoustic forcing to an axisymmetric low-density jet at frequencies around its natural global frequency. We place the jet in a rectangular box containing two loudspeakers, one at each end, producing nominally one-dimensional standing pressure waves. By traversing the jet across this box, we subject it to a range of acoustic modes, from purely longitudinal (streamwise) modes at the pressure anti-node to purely transverse (cross-stream) modes at the pressure node. Using time-resolved Background-Oriented Schlieren (BOS) imaging and hot-wire anemometry, we characterize the jet response for different forcing frequencies, amplitudes and mode shapes, providing new insight into the way transverse acoustic oscillations interact with axisymmetric hydrodynamic oscillations.

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