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Acoustic response of an isothermal coaxial swirling jet SAPTARSHI BASU, SANTHOSH RUDRASETTY, Department of Mechanical Engineering, Indian Institute of Science, Bangalore, India — This experimental study concerns acoustic response of internal recirculation zone (IRZ) in an unconfined isothermal coaxial swirling jet (geometric swirl number: 2-3). Two IRZ modes with characteristic modified Rossby number $Ro_m > 1$ and $Ro_m \leq 1$ are considered. It is observed that as the amplitude of excitation is increased till a critical magnitude the IRZ topology (time-mean streamline plot obtained from PIV) with $Ro_m \leq 1$ *fans-out*/widens. At super-critical amplitude the IRZ transits back and finally undergoes a transverse shrinkage. However, *fanning-out* is absent in $Ro_m > 1$ IRZ mode as this flow is dominated by pressure deficit due to entrainment (at the interface between central and co-annular jet) effect when compared to radial pressure gradient due to rotational influence. Thus the central jet with high kinetic pressure exists in $Ro_m > 1$mode (swirl fails to penetrate till the central axis and impart recirculation) but not in $Ro_m \leq 1$. The imparted acoustics fails to disrupt IRZ in $Ro_m > 1$against the high kinetic pressure of the central stream, failing to impart a *fan-out*.

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