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Azimuthally forced flames in an annular combustor NICHOLAS WORTH, JAMES DAWSON, NTNU, EPAMINONDAS MASTORAKOS, University of Cambridge — Thermoacoustic instabilities are more likely to occur in lean burn combustion systems, making their adoption both difficult and costly. At present, our knowledge of such phenomena is insufficient to produce an inherently stable combustor by design, and therefore an improved understanding of these instabilities has become the focus of a significant research effort. Recent experimental and numerical studies have demonstrated that the symmetry of annular chambers permit a range of self-excited azimuthal modes to be generated in annular geometry, which can make the study of isolated modes difficult. While acoustic forcing is common in single flame experiments, no equivalent for forced azimuthal modes in an annular chamber have been demonstrated. The present investigation focuses on the novel application of acoustic forcing to a laboratory scale annular combustor, in order to generate azimuthal standing wave modes at a prescribed frequency and amplitude. The results focus on the ability of the method to isolate the mode of oscillation using experimental pressure and high speed OH* measurements. The successful excitation of azimuthal modes demonstrated represents an important step towards improving our fundamental understanding of this phenomena in practically relevant geometry.

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