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Receptivity of a transversely forced jet[1] JOSE G. AGUILAR, EIRIK ASOY, JAMES DAWSON, NICHOLAS WORTH, Institute for Energy and Process Engineering, Norwegian University of Science and Technology (NTNU) — Annular combustion chambers are often used in gas turbines. These configurations are prone to thermoacoustic instabilities which emerge as standing or spinning azimuthal modes among others. During the instability the flow conditions of typical flames resemble swirling annular jets which are transversely forced by an acoustic wave. Previous studies suggest that in acoustically compact configurations the flame response to transverse flow excitation is strong if it is seen locally (within sections of the flame), but it is weak if it is seen globally given that there is negligible contribution to the total fluctuations of the heat release. By means of experimental analysis and numerical simulation the present study aims to quantify the receptivity of a more simplistic flow configuration, an isothermal jet subject to transverse forcing and elucidate the modes responsible for its strong local excitation. The jet is forced with a standing wave at different nodal positions. The experiments show that the response of the jet depends on the position of the acoustic wave and is described by a mixture of the symmetric and antisymmetric modes. Receptivity analysis is carried out using numerical simulation in order to quantify the strength of each mode at the different forcing positions.

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