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Intrinsic thermoacoustic modes in systems with two axially separated heat sources PHILIP BUSCHMANN, JONAS MOECK, NTNU — Modern gas turbines for power generation are required to provide high operational flexibility while complying with emission limits. Axially staged flames or sequential combustors are advantageous for this purpose. However, the distributed heat release rate in these systems gives rise to new thermoacoustic interaction phenomena. Recently, it was shown that a mechanism exists that does not require acoustic wave reflection at the boundaries. Instead, this so-called intrinsic feedback loop rests on the velocity fluctuation associated with the flame-emitted acoustic wave traveling upstream. We study intrinsic thermoacoustic modes in a generic combustor with two axially separated heat sources. Computations of the spectrum under parameter variations show that both flames have individual intrinsic feedback mechanisms but also interact directly, without acoustic reflection. Furthermore, allowing for a convective response mechanism from the first flame to the second gives rise to an additional intrinsic feedback loop. A combustor with two sequential heat sources, therefore, exhibits a dramatically increased number of intrinsic modes.

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