

Abstract Submitted
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Asymmetric forcing of two coupled thermoacoustic oscillators¹

BO YIN, YU GUAN, LARRY K.B. LI, The Hong Kong University of Science and Technology — In many combustion systems, such as gas turbines and domestic boilers, the presence of self-excited thermoacoustic oscillations can reduce reliability and efficiency. Recent studies have shown that such oscillations can be eliminated by carefully tuning the dissipative and time-delayed coupling between adjacent combustors, exploiting a nonlinear phenomenon known as amplitude death (AD). However, although the coupling conditions required for AD are well known, they may still be beyond the reach of practical systems because of the inherent space and operational limitations that such systems face. To address this issue, we examine whether external forcing can be used to enlarge the AD boundaries of a coupled thermoacoustic system. The system consists of two self-excited thermoacoustic oscillators interacting with each other via tunable levels of dissipative and time-delayed coupling. By varying the strength of the forcing acting on each oscillator and the phase difference and detuning between the two forcing signals, we map out the forcing conditions required for AD under different internal coupling conditions, paving the way for an alternative method of suppressing harmful thermoacoustic oscillations in combustion systems.

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