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Spatio-temporal Linear Stability Analysis of Multiple Reacting Wakes JACOB KUNNUMPURAM SEBASTIAN, BENJAMIN EMERSON, TIM LIEUWEN, Georgia Institute of Technology — Hydrodynamic stability of reacting shear flows plays a key role in controlling a variety of combustor behaviors, such as combustion instability, mixing and entrainment, and blowoff. A significant literature exists on the hydrodynamics of single bluff body flows, but not the multi- bluff body flows that are found in applications. The objective of this work was to compare the spatio-temporal stability of multiple reacting wakes and single reacting wakes, within the framework of linear stability theory. Spatio-temporal stability analyses are conducted on model velocity and density profiles, with key parameters being the density ratio across the flame, bluff body spacing, dimensionless shear, and asymmetry parameters (if the two wakes are dissimilar). The introduction of the additional bluff body can exert both a stabilizing and destabilizing effect on the combined two-wake system, depending on the spatial separation between the bluff bodies. Furthermore, while the most rapidly amplified mode of the single wake mode is the sinuous (asymmetric) one, in the two wake system, the most rapidly amplified mode can be either sinuous or varicose (symmetric), also depending on spatial separation.

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