

Abstract Submitted  
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**Characterization of hydrodynamic instabilities in non- premixed flames by combining detailed simulations and linear stability analysis** YEE CHEE SEE, MATTHIAS IHME, University of Michigan — Numerical simulations and linear stability analysis are invaluable tools in complementing experiments to obtain improved understanding about instability mechanisms in non-premixed and premixed flames. By utilizing the experiments of Fűri et al., the objective of this study is to characterize hydrodynamic instability mechanisms in methane/air diffusion flames. To this end, detailed simulations are performed to obtain the reactive mean flow, which is used as input to the linear stability analysis. In order to account for the detailed reaction chemistry and variations in thermo-viscous properties, a flamelet-representation is introduced in the linear stability method. Model predictions for growth rate and phase velocity are compared with experimental data, and parametric studies are performed to quantify effects of heat-release and detailed chemistry in controlling hydrodynamic instabilities.

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