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Dynamics of Isolated and Interacting Flame Structures in Strongly-Pulsed, Turbulent Jet Flames<sup>1</sup> MATHIEU FREGEAU, YING-HAO LIAO, JAMES HERMANSON, University of Washington, DENNIS STOCKER, UDAY HEGDE, NASA — The dynamics of the large-scale structures in stronglypulsed, turbulent diffusion flames were studied in normal- and microgravity. Crosscorrelation of temperature measurements and high-speed flame imaging were used to estimate the celerity of the flame structures. Both diagnostics indicate a marked increase in celerity with the increasing flame puff interaction as the jet off-time decreases. The celerity is also generally higher for shorter injection times, which yield more compact flame puffs. These trends are seen both for the case of fixed injection velocity as well as for the case of fixed fueling rate. The celerity correlates well with the inverse downstream distance scaled with an appropriate injection parameter, suggesting that the impact of buoyancy can be partially accounted for by the corresponding changes in the mean flame length. Differences in the values of celerity determined by the temperature and visual techniques can be attributed to nature of the evolution of the flame puffs with downstream distance.

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