

Abstract Submitted  
for the DFD17 Meeting of  
The American Physical Society

**The origin and structure of streak-like instabilities in laminar boundary layer flames**<sup>1</sup> MICHAEL GOLLNER, COLIN MILLER, WEI TANG, University of Maryland, MARK FINNEY, USDA Forest Service — Streamwise streaks are consistently observed in wildland fires, at the base of pool fires, and in other heated flows within a boundary layer. This study examines both the origin of these structures and their role in influencing some of the macroscopic properties of the flow. Streaks were reproduced and characterized via experiments on stationary heated strips and liquid and gas-fueled burners in laminar boundary layer flows, providing a framework to develop theory based on both observed and measured physical phenomena. The incoming boundary layer was established as the controlling mechanism in forming streaks, which are generated by pre-existing coherent structures, while the amplification of streaks was determined to be compatible with quadratic growth of Rayleigh-Taylor Instabilities, providing credence to the idea that the downstream growth of streaks is strongly tied to buoyancy. These local instabilities were also found to affect macroscopic properties of the flow, including heat transfer to the surface, indicating that a two-dimensional assumption may fail to adequately describe heat and mass transfer during flame spread and other reacting boundary layer flows.

<sup>1</sup>This work was supported by NSF (CBET-1554026) and the USDA-FS (13-CS-11221637-124).

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Date submitted: 30 Jul 2017

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