

THE DYNAMICS OF AN EDGE-FLAME IN A MIXING LAYER

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ABSTRACT The dynamics of an edge-flame in a mixing layer is considered. The flame has a tribrachial structure that consists of a lean premixed segment leaning towards the oxidizer-side, a rich premixed segment leaning towards the fuel-side and a diffusion flame trailing behind. The edge of the flame is generally stabilized by conductive heat losses to the plate separating the fuel and oxidizer stream, and stands at a well defined distance from the plate. Within the context of a diffusive-thermal model, we describe numerically the steady and unsteady behavior of the flame. Our objective is to systematically identify the conditions for the onset of oscillations and examine, in particular, the influence of differential and preferential diffusion, mixture-strength, flow rate and radiative heat losses on the onset of the instability.