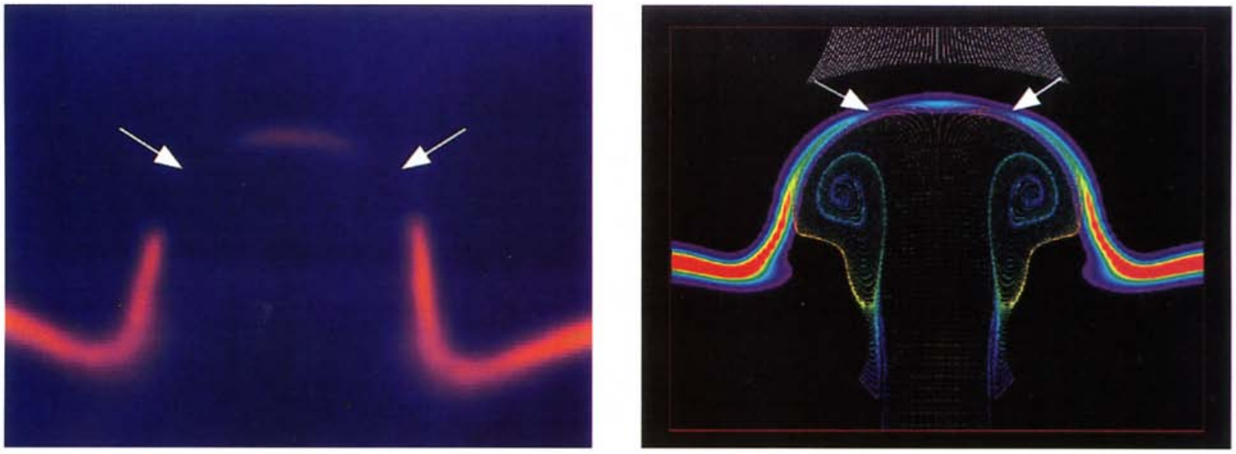

Figure 1. Agreement between Experimental (left) and Computed (right) Flame (OH) Distributions in a Counterflow Burner. Arrows indicate region of local flame extinction; streaklines (color coded with injection location) are shown in the computed image.

Figure 2. Experimental Setup (Red=Flame, Green=Vortex).

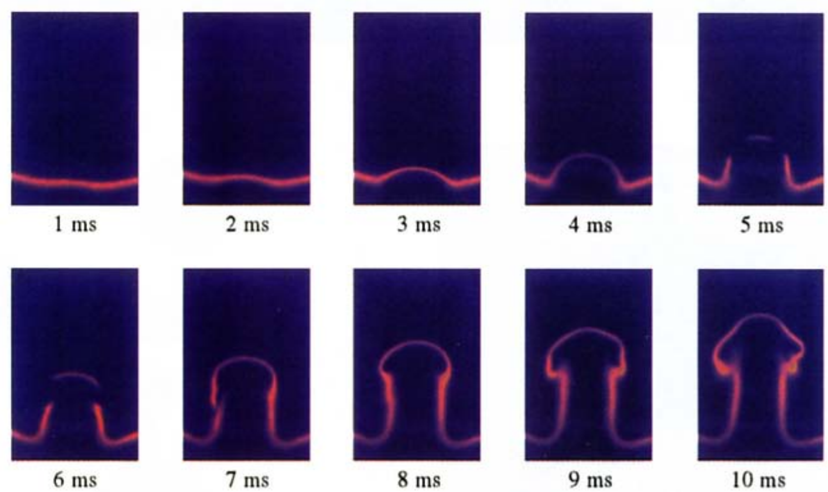

Figure 3. Evolution of the Flame (OH) Distribution in a Counterflow Burner Showing Local Extinction (5 ms), Separation (6 ms), and Reattachment (7 ms).

FLAME-VORTEX INTERACTIONS IN A COUNTERFLOW BURNER

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In a rare instance when computational predictions (Katta et al., 1998) precede experimental results, we find that local extinction of a non-premixed hydrogen/nitrogen/air counterflow diffusion flame occurs at the sides and not the center of the impinging vortex. In a counterflow burner (Rolon et al., 1995), hydrogen and nitrogen diluent flow from above at 6 and 15 lpm, while air flows from below at 15 lpm, producing a global strain rate of 20 s^{-1}. The computational image is obtained using a third-order-accurate, time-dependent, computational fluid dynamics with chemistry code with detailed chemical kinetics (14 species, 74 reactions). The experimental images are recorded at 1-ms intervals using planar laser-induced fluorescence of OH with an intensified CCD camera. The evolution of the flame showing local extinction, separation, and reattachment is obtained by delaying the laser pulses and camera timing relative to the motion of the vortex-producing piston.