Abstract Submitted
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Time constants in the transition between equilibrium and nonequilibrium combustion states of premixed burner flame irradiated by pulsed microwave K. SASAKI, Hokkaido University, K. SHINOHARA, Nagoya University — We investigated the time constants in the transition between the equilibrium and nonequilibrium combustion states. We examined the temporal variations of the optical emission intensities from the flame irradiated by pulsed microwave. The transitions (optical emissions) we detected were $C^3\Pi_u - B^3\Pi_g$ of N_2, $A^2\Sigma^+ - X^2\Pi$ of OH, $A^2\Delta - X^2\Pi$ of CH, and continuum at a wavelength of 430 nm. The temporal variations were approximated using exponential functions. The rise and fall time constants of the optical emission intensity of N_2 were 0.35 and less than 0.05 ms, respectively. Both the rise and fall time constants of the optical emission intensities of OH and CH were 0.35-0.4 ms, while the rise and fall time constants of the continuum optical emission intensity were 0.5 ms, which coincided with the time constant of the transport (flow) loss of particles. It is considered that the fall time constant of N_2 represents the heating (cooling) time constant of the electron energy, while its rise time constant represents the loss time constant of electrons. The time constants of electrons, OH, and CH are governed mainly by the transport loss, but the experimental results suggest additional frequencies of $(0.5 - 1) \times 10^3$ Hz for their volume losses.

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