SELF-IGNITION OF H_2/O_2 AND $H_2/O_2/CO$ MIXTURES BEHIND REFLECTED SHOCK WAVES

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Abstract: Time histories of the intensities of the absorption by ground-state hydroxyl radicals OH at $\lambda = 306.77$ nm and the emission from electronically excited OH* ($A^2\Sigma^+ \to X^2\Pi$ transition, $\lambda = 310 \pm 4$ nm) were measured. Based on these measurements, the ignition delay time was determined as the time interval between the time of arrival of the reflected shock wave and the time of reaching the maximum intensity of OH* emission. The corresponding temperature dependences of the ignition delay times for various H_2/O_2 and $H_2/CO/O_2$ mixtures were plotted. Detailed kinetic simulations of the profiles of electronically excited OH* radicals were performed and compared with the experimentally measured profiles to gain insights into the mechanism of the electronic excitation and quenching of these species.

Keywords: kinetics of self-ignition of hydrogen–oxygen mixtures and syngas; ignition delay time; chemiluminescent emission of hydroxyl radicals; numerical simulation

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