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ВОСПЛАМЕНЕНИЕ СТЕХИОМЕТРИЧЕСКОЙ СМЕСИ АЦЕТОНА С КИСЛОРОДОМ ЗА ОТРАЖЕННЫМИ УДАРНЫМИ ВОЛНАМИ: ЧИСЛЕННОЕ МОДЕЛИРОВАНИЕ КИНЕТИКИ СВЕЧЕНИЯ OH^* И CO_2^* И ПОГЛОЩЕНИЯ CO_2[§]

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Аннотация: Проведено численное моделирование воспламенения стехиометрической смеси $0{,}5\%(CH_3)_2CO + 2\%O_2$ в аргоне за отраженными ударными волнами в диапазоне температур 1310–1810 К при давлениях 1 и 5 атм. Для расчетов использовался ряд детальных кинетических механизмов (ДКМ), представленных в литературе. Сравнение расчетных значений задержек воспламенения проводилось с экспериментальными данными по свечению OH^*, CO_2^* и поглощению CO_2. Установлено, что представленные в литературе различные ДКМ описывают наблюдаемые задержки воспламенения и профили эмиссии с различной степенью точности.

Ключевые слова: кинетика воспламенения; численное моделирование; детальный кинетический механизм; задержка воспламенения; электронно-возбужденные состояния радикалов

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IGNITION OF A STOICHIOMETRIC ACETONE–OXYGEN MIXTURE BEHIND REFLECTED SHOCK WAVES: NUMERICAL SIMULATION OF THE KINETICS OF LUMINESCENCE OF OH^* AND CO_2^* AND ABSORPTION OF CO_2

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Abstract: A numerical simulation of the ignition of a $0.5\%(CH_3)_2CO + 2\%O_2 + Ar$ mixture behind reflected shock waves in the temperature range 1310–1810 K at pressures of 1 and 5 atm has been performed. A number of detailed kinetic mechanisms (DKMs) reported in the literature have been tested. The calculated values of the ignition delay time have been compared to the respective experimental data obtained by monitoring the emission of OH^* and CO_2 and the absorption of CO_2. It was demonstrated that the different DKMs presented in the literature describe the measured ignition delay times and emission profiles with varying degrees of accuracy.

Keywords: kinetics of ignition; numerical simulations; detailed kinetic mechanism; ignition delay time; electronically excited states of radicals

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