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Application of detailed reaction mechanism for simulating *n*-heptane drop ignition and combustion in a heterogeneous detonation wave

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In this paper, autoignition and combustion of *n*-heptane drops in uniform monodispersed drop suspensions in air was simulated numerically with due regard for the detailed reaction mechanism of *n*-heptane oxidation taking into account cool-flame, blue-flame, and hot-explosion kinetics. The mathematical model is based on the first principles and does not contain fitting parameters. The combustion constant of the drop burning rate has been calculated within wide ranges of pressure, temperature, equivalence ratio, and drop diameter. The predicted ignition delays have been compared with available measurements. The results of calculations are in reasonable agreement with experimental data. Based on the model, the detonability of *n*-heptane drop suspensions in air and in oxygen has been estimated for the conditions without/with partial preliminary drop vaporization.