Review of the kinetic mechanisms for modeling the combustion and detonation of acetylene-based mixtures

Yarkov A V[1,2,@], Kiverin A D[1], Yakovenko I S[1] and Turnin A V[1,2]

[1] Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia
[2] Bauman Moscow State Technical University, 2nd Baumanskaya Street 5, Moscow 105005, Russia

[@] yarkov.andrey.v@gmail.com

An overview of the available kinetic mechanisms, which can be used to numerically simulate the combustion and detonation processes, including the deflagration-to-detonation transition, in acetylene-based mixtures is presented. The validation of the mechanisms consisted in comparing the ignition delay time and normal burning rate predicted on the basis of the numerical solution of the gas dynamics equations with the known experimental data. The ignition delay time was estimated as the time instant of the onset of intense heat release due to chemical reactions, and the normal burning rate was calculated using the Michelson formula. Using the most successfully tested mechanisms, a primary analysis of the deflagration-to-detonation transition criteria was carried out according to the method described in [1].
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