Flame dynamics in highly active acetylene-based mixtures in channels of various widths

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The results of numerical simulation of flame propagation of an acetylene-oxygen mixture diluted with nitrogen to a dilution degree of 25% in a long channel are presented. The calculation was carried out using the modern non-dissipative method "CABARET". The influence of the channel width on the dynamics and the evolution of the flame front structure scenario is demonstrated, namely, it is shown that an increase in the channel width leads to an increase in the flame propagation velocity and the amplitude of velocity pulsations at the quasi-stationary stage of flame propagation. For the case of a wide channel ($H = 20$ mm), the process of transition to detonation is described in detail. The results are compared with the known experimental data [1], on the basis of which the main physical mechanisms that determine the unsteady acceleration of the acetylene-based mixtures flames in the channels were identified. The research was financially supported by the Russian Foundation for Basic Research (grant No. 20-58-04024).

[1] Krivosheyev P N, Novitski A O and Penyazkov O G 2022 *Russian Journal of Physical Chemistry B* **16** 661–669