Detailed numerical analysis of flame instability development in a channel for tabulated chemistry approach

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Using detailed numerical modeling, the combustion process inside a two-dimensional open channel filled with hydrogen–air mixtures of various compositions is analyzed. All the stages of flame front evolution under the influence of instability development are discussed and examined. Obtained results—in particular, the dynamics of the state space of the combustible mixture observed during the flame evolution process—are implemented as a basis for the tabulated chemistry approach. Further, the applicability and performance of the tabulated chemistry developed via the proposed technique are analyzed and discussed. This research was carried out using supercomputers at the Joint Supercomputer Center of the Russian Academy of Sciences (JSCC RAS).