PULSATING DETONATION WAVE INVESTIGATION USING SHOCK-CAPTURING METHODS AND CALCULATIONS IN SHOCK-ATTACHED FRAME

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Abstract: The problem of one-dimensional pulsating detonation wave propagation is considered in two statements. In the first statement, the detonation wave is initiated at the closed end of the channel. Further detonation wave propagation is calculated in the laboratory frame of reference by the shock-capturing method of the second approximation order based on ENO (essentially nonoscillatory) scheme and Runge–Kutta method. For the steady regime of detonation wave propagation, the dependence of the peak pressure on time is characterized by high-frequency pulsations. In the second statement, the pulsating detonation wave is computed in the shock-attached frame of reference. The appropriate numerical algorithm of the second approximation order in the finite-volume formulation is developed. The comparison of the computational results in the two statements demonstrates the numerical nature of high-frequency pulsations which are obtained in the first statement by the shock-capturing method.

Keywords: pulsating detonation wave; mathematical modeling; ENO-schemes; shock-attached frame of reference

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