ON A THEORETICAL PREDICTION OF THE DYNAMICS OF PULSATING AND CELLULAR DETONATIONS IN GASES

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Abstract: The propagation of a multidimensional detonation is studied in an asymptotic approximation of weak nonlinearity, i. e., at wave speeds only slightly exceeding the acoustic speed in the fresh combustible gas. In combination with a number of other simplifying assumptions concerning the nature of the gas, the temperature sensitivity of reactions, and the character of the detonation propagation, a simplified model has been derived from the full system of governing equations that is capable of reproducing, both qualitatively and quantitatively, such well known regimes of detonation propagation as pulsating one-dimensional detonation and cellular multidimensional detonation. Certain peculiar properties of the model are discussed.

Keywords: detonation theory; pulsating detonation; cellular detonation

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