

COMPACT PULSE PREDETONATOR TO INITIATE THE WORKING PROCESS IN DETONATION CHAMBERS

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Abstract: Presented are the results of experimental study of the possibility of organizing a fast cyclic deflagration-to-detonation transition (DDT) at short distances in a smooth tube with separate supply of gaseous fuel components — natural gas and oxygen — without the use of turbulizing obstacles. The idea underlying the work is to create the conditions for fast flame acceleration in a smooth tube by means of cross-flow high-speed gas jets providing high turbulence. The experiments carried out in a single pulse mode and in a frequency mode (frequency up to 10 Hz) have shown that the turbulence created by supersonic fuel and oxidizer jets which are injected under a pressure ranging from 25 to 150 atm in a smooth detonation tube 74 mm in diameter allows obtaining the fast DDT at distances less than 300 mm for the time interval shorter than 0.4 ms. The obtained results can be used to create compact predetonators for detonation combustion chambers of a perspective energy conversion devices.

Keywords: fast DDT; natural gas; oxygen; turbulence; smooth channel

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