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SUPERCOMPUTER MODELING OF PULSE DETONATION ENGINES FED BY ACETYLENE OR HYDROGEN

Abstract

Computer aided design of new effective engines needs mathematical tools for supercomputer modeling of components mixing and combustion in rocket engines. Pulse detonation engines is a new trend in increasing rocket engines effectiveness. The paper presents the results of developing verification and validation of mathematical model making it possible to simulate unsteady processes of ignition and deflagration to detonation transition in novel type of pulse detonation engines. One of peculiarities of hydrogen-oxygen rocket engine is the following. On injecting liquid components fuel (hydrogen) having must lower critical temperature comes pre-evaporated and pre-heated in combustion chamber, while oxygen could be liquid then evaporating inside the chamber. Thus, contrary to most types of engines hydrogen engine has an inverse mixture entering combustion chamber, in which fuel is gaseous and oxidant is liquid. The authors wish to acknowledge the support by Russian Foundation for Basic Research (Grants 13-07-00067 and 13-03-00003).