COMBUSTION WAVE VELOCITY IN A PULSED DETONATION COMBUSTOR OPERATING ON HEPTANE AND ON JET A-1 FUEL

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Abstract: The article is devoted to the study of the dynamics of combustion wave propagation in heptane/air and Jet A-1 / air mixtures enriched with oxygen in a small-size pulsed detonation combustor. It was found that combustion in both mixtures is characterized by wave acceleration and gradual increase in its velocity as the equivalence ratio increases from 0.7 to 1.0 with the maximum near the stoichiometric composition. At the same time, the increase in the combustion wave velocity during combustion of heptane with air and oxygen is significantly higher than during combustion of a jet fuel / air / oxygen mixture: in the first case, the velocity increases by a factor of more than 4 (from 500 to over 2000 m/s) while in the second case, it only doubles (from 470 to 960 m/s).

Keywords: wave velocity; heptane; jet fuel; equivalent ratio; oxygen-to-air ratio

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Figure Captions

Figure 1 Records of four pressure sensors during one pulse in the pressure–time plot

Figure 2 Dependences of the combustion wave velocity on the equivalence ratio in a pulse detonation combustor for heptane/air/oxygen (*a*) and Jet A-1 / air / oxygen (*b*) mixtures: *1* — measuring segment 2, 140–240 mm; *2* — 3, 240–340 mm; and *3* — 4 + 5, 340–640 mm

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