DATABASE FOR CALCULATING LAMINAR AND TURBULENT COMBUSTION OF AVIATION KEROSENE – AIR MIXTURES

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Abstract: Based on the numerical solution of the problem of planar laminar flame propagation velocity and structure, a database for the most important characteristics of laminar combustion of jet fuel JP-8 — an analogue of domestic TS-1 — with air has been developed. Kerosene surrogate was simulated by fuel consisting of a mixture of nine n-alkanes, C_nH_{2n+2} ($n = 8, 9, \ldots, 16$). Calculations were made with the overall kinetic mechanism of oxidation and combustion of normal paraffin hydrocarbons validated by comparing the predicted and measured laminar burning velocities in JP-8–air mixtures of different compositions at different initial temperatures and pressures. The database includes the following characteristics: normal laminar flame velocity, laminar flame thickness, kinematic viscosity, and Lewis number of gas mixture — parameters entering various semiempirical relations for the turbulent burning velocity. The values of these characteristics are obtained in wide ranges of initial temperature (up to 900 K), pressure (up to 100 atm), and mixture composition (from extremely fuel-lean to extremely fuel-rich).

Keywords: combustion; surrogate fuel; JP-8; laminar flame database

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