Laminar burning velocities of n-decane with ethanol additions

S.S. Matveev[1], I.V. Chechet[1], S.G. Matveev[1], A.A. Konnov[2]

[1] *Scientific and Educational Centre of Fluid Dynamics Research, Samara National Research University, Samara, Russia*

[2] *Division of Combustion Physics, Lund University, Lund, Sweden*

Aviation kerosene or jet fuel is a complex mixture of different classes of hydrocarbons with the major contributors being normal alkanes, branched chain paraffins (iso-alkanes), aromatic molecules and cyclic paraffins, cycloalkanes. Biofuel additions to jet fuel increase the burning velocity and improve combustion process. Laminar burning velocity of iso-octane, n-heptane with ethanol additions has been determined in Lund before. n-Decane is a representative of the class of alkanes and many previous studies proposed n-decane as a component of surrogate blends for aviation or engine fuels. Measurements of the adiabatic laminar burning velocities of *n*-decane with ethanol additions are reported. Non-stretched flames were stabilized on a perforated plate burner at 1 atm. The Heat Flux method was used to determine burning velocities under conditions when the net heat loss from the flame to the burner is zero. Initial temperatures of the gas mixtures with air were 338, 358 and 400K. The measurements were performed on two experimental setups at Lund University and Samara *National Research* University. Our results obtained at the same initial temperatures are in good agreement. The high-temperature detailed (ver. 1412) kinetic mechanism for kerosene developed at Politecnico di Milano was used to simulate the results. Uncertainties of the measurements were analyzed and assessed experimentally. The overall accuracy of the burning velocities was estimated to be better than ±1 cm/s.

This work was supported by the Ministry of education and science of the Russian Federation in the framework of the Program "Research and development on priority directions of scientific-technological complex of Russia for 2014-2020" (RFMEFI58716X0033). The authors would also like to acknowledge the financial support from the Centre for Combustion Science and Technology (CECOST), Sweden.