NUMERICAL INVESTIGATION ON CONVECTIVE HEAT TRANSFER OF AVIATION KEROSENE IN A VERTICAL MINI-TUBE AT SUPERCRITICAL PRESSURES

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ABSTRACT Convective heat transfer of aviation kerosene at supercritical pressures in a vertical upward tube of diameter 1.8 mm was numerically studied using RNG *k*-(turbulence model with enhanced wall treatment. The thermo-physical and transport properties of the China RP-3 kerosene at various temperatures were obtained by a 10-species surrogate and the NIST Supertrapp software. The grid independence was first studied and numerical results were then compared with experimental data for validation. Effects of mass flow rate, heat flux, pressure and inlet temperature on the heat transfer performance were investigated. Under flow conditions given in this work, the results show that the heat transfer coefficient increases with mass flow rate, heat flux or inlet temperature, while increase in inlet pressure reduces heat transfer coefficient. The buoyancy force has little effect on heat transfer.

KEYWORDS: aviation kerosene, heat transfer, supercritical pressure, buoyancy effects