# Thermal Conductivity of Jet Fuels at Temperatures from 300 K to 550 K with Pressures Up to 70 MPa

Richard Perkins [C, S]
*Thermophysical Properties Division, National Institute of Standards and Technology, Boulder, CO, U.S.A.*

The thermal conductivity of several jet fuel samples was measured in the liquid phase with a transient hot-wire apparatus over the temperature range from 300 K to 550 K with pressures up to 70 MPa. This apparatus has an upper temperature limit of 750 K with a double-wire cell that eliminates errors due to axial conduction. The jet fuels that were studied include traditional petroleum distillates, with 3 samples of Jet A and 1 sample of JP-8, as well as a synthetic fuel designated as S-8 that was produced with the Fischer-Tropsch process from natural gas. These complex samples have hundreds of components and their composition was characterized at NIST. The highest temperature studied for each sample was limited by its thermal stability. The correction to the measured thermal conductivity for thermal radiation increased in proportion to the absolute temperature cubed. The thermal conductivity data reported here have an expanded uncertainty (coverage factor k=2) of less than 1 %. The thermal conductivity of the three samples of Jet A varied significantly, as did their composition and heat of combustion, demonstrating the need for property models for complex fuel mixtures that can account for such differences in composition. The synthetic S-8 sample was primarily a mixture of paraffins, monocycloparaffins, and alkylaromatics. The Jet A and JP-8 samples also contained significant concentrations of dicycloparaffins, alkylaromatics, indanes, and tetralins. Surrogate models have developed at NIST to estimate the thermophysical properties of several complex fuel mixtures. Comparisons are made with relevant surrogate models.