Correlation for the Viscosity of Methane (CH_4) from the Triple Point to 625 K and Pressures to 1000 MPa

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A wide-ranging model for the viscosity surface of methane (CH4) has been developed that incorporates the generalized friction theory (GFT). The approach requires, as the core thermodynamic model, a reference-quality equation of state (EoS). Here the EoS of U. Setzmann and W. Wagner has been selected for that purpose. All available experimental data, to the extent of our knowledge, were considered in the development of the model. The span of data used for the regression covers from the triple point to 625 K and up to 1000 MPa. The model reproduces most of the primary data close or within the reported uncertainty: under 0.3 % for temperatures between 200 K and 400 K and pressures up to 30 MPa and up to 2 % over the fluid surface to 200 MPa. For extended pressures the uncertainty increases to 5 % up to 500 MPa and to 10 % from 500 to 1000 MPa for the full temperature range. The best model performance is expected between 200 K and 500 K and pressures up to 200 MPa, where the uncertainty is expected to be between 0.1 % at low pressures and under 2 % at elevated pressures. The model extrapolates in a physically reasonable manner and may be used at pressures up to 1000 MPa and temperatures from the triple point to 1000 K.