The viscosity coefficient of gaseous nitrogen was measured with a vibrating-wire viscometer of very high precision. The obtained data can be used to test and possibly to improve the viscosity surface correlation of this fluid which belongs to the main constituents of air and natural gas. Such correlations are of importance for the further development of the calculation procedures for the viscosity of mixtures like air, humid air or natural gas. They are needed for a more accurate basic design of compressors, gas turbines, and pipelines.

The measurements were performed along six supercritical isotherms at (298.15, 323.15, 348.15, 373.15, 398.15, and 423.15) K. The maximum pressure for the supercritical isotherms was 35 MPa. The calculation of the gas densities needed for the evaluation of the measuring values was performed using an equation of state by Span et al. [1]. In general, the measurements are characterized by a reproducibility of ± (0.05 to 0.1) %, whereas the total uncertainty is estimated to be ± (0.25 to 0.4) %. The viscosity values of the isotherms were correlated as a function of the reduced density using a power series representation restricted to the fourth power or a lower power depending on the temperature of the isotherm.

The new data are very accurate and appropriate to test the viscosity surface correlations available for nitrogen in the literature [2-4]. The comparison with the correlation by Stephan et al. [2] as well as with the very recent correlation by Lemmon and Jacobsen [4] shows only deviations of ± 0.7 % in the whole temperature and density range of our measurements. On the contrary, the differences between the correlation by Millat and Vesovic [3] and our experimental values amount to -1.5 % up to + 3 %, distinctly higher than the mutual uncertainties of experiment and correlation. Furthermore, the new values are compared with direct experimental data [5-9].