

Measurements of the Speed of Sound in the Refrigerants 227ea and 365mfc in the Liquid Phase

K. Meier^{C,S} and S. Kabelac

University of the Federal Armed Forces Hamburg, Helmut-Schmidt-University, Hamburg, Germany
karsten.meier@hsu-hh.de

The speed of sound in the liquid phase of the refrigerants 227ea (1,1,1,2,3,3,3- heptafluoropropane) and 365-mfc (1,1,1,3,3-pentafluorobutane) was measured with high accuracy. For both substances, the measurements were carried out on ten isotherms and cover the temperature range from 240 K to 420 K under pressures up to 100 MPa. Our acoustic sensor employs a pulse-echo technique, originally developed by Kortbeek *et al.* [1]. A piezoelectric quartz crystal, which serves as a sender and receiver, is mounted asymmetrically between two reflectors, with distances of about 20 and 30 mm to the reflectors. The speed of sound in the sample liquid is equal to two times the difference of these distances divided by the difference between the round-trip times needed for short burst signals to travel each distance. The measured uncertainties are 3 mK for the temperatures, 0.01 % for pressures below 10 MPa, 0.005 % for pressures between 10 MPa and 100 MPa, and 0.05 % for the speed of sound. This contribution briefly describes the apparatus and discusses the measurement results. Comparisons with literature data will be given, showing that our data are more accurate than all previously published literature data for these substances.

[1] Kortbeek *et al.*, *Rev. Sci. Instr.* **56**, 1269 (1985).