Speed of Sound Measurements of liquid methane at cryogenic temperature

Original

Availability:
This version is available at: 11583/2858357 since: 2020-12-18T15:36:28Z

Publisher:
Politecnico di Torino

Published
DOI:

Terms of use:
Altro tipo di accesso
This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)
Summary

Thesis Title: *Speed of Sound Measurements of liquid methane at cryogenic temperature*

Candidate: *Giuseppe Cavuoto*

This thesis reports speed of sound experimental measurements in liquid methane (CH₄) along five isotherms, in the temperature range of (130 and 162) K, and for pressures up to 10 MPa. A dedicated experimental apparatus, custom-designed for accurate speed of sound measurement at cryogenic temperatures and high pressures, has been developed and the double pulse-echo technique has been adopted. In order to characterize this new apparatus and its performance, experimental results have been compared with speed of sound values of liquid methane available in literature. A further comparison has been made between the experimental measurements and the speed of sound values obtained using the reference equation of state of methane of Setzmann and Wagner, as well as the GERG-2008 model. The relative expanded uncertainty (k=2) associated to the obtained results is in the order of 0.4 %, mainly influenced by the repeatability of the measurements. Finally, density measurements of two different multi-component LNG mixtures along four isotherms (100, 120, 140 and 160) K and for pressures up to 10 MPa have been reported. Then, the obtained results, with an uncertainty of about 0.04 %, have been compared with the predicted values, calculated by using four different equations of state: the COSTALD3 equation of state, the ERKM equation of state, the GERG-2008 model, and the EOS-LNG model.