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**Estimation of thermophysical properties of fluids under high
pressure from speed of sound measurements**

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The thermophysical properties of pure substances in fluid state as functions of temperature and pressure are of great interest not only for industrial applications (for example in the oil and gas industry), but also for fundamental aspects in view of developing models for an accurate representation of dense fluids. Now these measurements are difficult to perform under pressure, particularly for non single-phase systems, at atmospheric pressure. An interesting alternative consists in using the ultrasonic velocity which can be determined experimentally with a high degree of accuracy including at high pressures and high temperatures, and which presents the advantage of giving access to various derived properties. This potential, which is specific to ultrasonic velocity in fluids, has been the starting point for the investigation of a large number of pure liquids and gases as well as of several types of mixtures by ultrasonic measurements. In this work we will review the procedures used to evaluate thermophysical properties as a function of pressure from speed of sound measurements. The validity of the different approaches will be checked by comparison to several thermophysical properties measured in an extended pressure range. The accuracy reached for each property by the different procedures will be brought out.