

MEASUREMENT OF DENSITY, SOUND VELOCITY, SURFACE TENSION, AND
VISCOSITY OF FREELY SUSPENDED SUPERCOOLED LIQUIDS

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Non-contact methods have been implemented in conjunction with levitation techniques to carry out the measurement of the macroscopic properties of liquids significantly cooled below their nominal melting point. Free suspension of the sample and remote methods allow the deep excursion into the metastable liquid state and the determination of its thermophysical properties. This approach has been used to investigate common substances such as water, o-terphenyl, succinonitrile, as well as higher temperature melts such as molten iridium, aluminum and other metals. These techniques have thus far involved ultrasonic, electromagnetic, and more recently electrostatic levitation. The resulting magnitude of maximum thermal supercooling achieved have ranged between 10 and 15% of the absolute temperature of the melting point for the materials mentioned above. The physical properties measurement methods have been mostly novel approaches, and the typical accuracy achieved have not yet matched their standard equivalent techniques involving contained samples and invasive probing. They are currently being refined, however, as the levitation techniques become more widespread, and as we gain a better understanding of the physics of levitated liquid samples. A partial summary of the results we have thus far obtained and a short discussion of the advantage of low gravity will be presented,