The sound speed measurements for liquid lead

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We are developing an experimental technique for the measurements the speed of sound in liquid metals at high temperatures (5–20 kK) and pressures (0.3–3.0 GPa), which are achieved in dynamic experiments [1]. Such experiments make it possible to measure the specific volume, pressure, specific enthalpy, and electrical conductivity of a sample for a quasi-static process, in which the volume, enthalpy, and pressure increase monotonically from normal values. To measure the speed of sound on the surface of the sample (a strip of foil placed between two plates of window material) an acoustic disturbance is generated using a laser pulse. The arrival of this disturbance on the opposite surface of the sample is recorded using a laser interferometer. The speed of sound is defined as the ratio of the thickness of the sample to the time interval during which the acoustic disturbance passes through it [2].

Experimental data on the dependence of the speed of sound in liquid lead on density and pressure are presented. The uncertainties of our measurements of the speed of sound are estimated.

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[1] Kondratyev A M, Korobenko V N and Rakhel A D 2018 *J. Exp. Theor. Phys.* **127** 1074–1086

[2] Kondratyev A M and Rakhel A D *Non-ideal Plasma Physics Workshop, December 16–17 2020, Moscow, Russia*