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Ultrasonic studies of the magnetic phase transition in MnSi

ALLA PETROVA, SERGEI STISHOV, Institute for High Pressure Physics, Troitsk, 142190 Moscow Region, Russia — We report results of the ultrasonic studies of a single crystal of MnSi in the temperature range 4-150 K, performed using digital pulse echo techniques. All the elastic constants and their combinations except for c_{44} reveal profound rounded dips at temperature ≈ 29.6 K with discontinuities at the low temperature sides of the dips at ≈ 28.9 K, which corresponds to the magnetic phase transition in MnSi. Both of these features are beautifully correlate with the heat capacity, thermal expansion and resistivity data, obtained with the same single crystal of MnSi, but the sharp peaks of the mentioned quantities are replaced by the modest discontinuities in the elastic properties at the phase transition. The sound attenuation displays a double peak structure and looks like an almost exact copy of the corresponding curves, characterizing behavior of the heat capacity, thermal expansion and resistivity in the vicinity of the phase transition in MnSi. All the features observed correspond to a first order phase transition at 28.9 K.

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