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Ultrasonic study of $Gd_5(Si_2Ge_2)$ elastic properties O. SVITELSKIY, A. SUSLOV, National High Magnetic Field Laboratory,FL32310, T.A. LOGRASSO, D.L. SCHLAGEL, V.K. PECHARSKY, K.A. GSCHNEIDNER, JR., Ames Laboratory, Iowa State University, IA 50011 — $Gd_5(Si_2Ge_2)$ undergoes a magnetic-martensitic transition near room temperature modifying its symmetry from an orthorhombic to a monoclinic structure. A giant magnetocaloric effect ($\Delta T/\Delta B \sim 8K/2T$) and a colossal strain (up to 10000ppm) can be induced both thermally and magnetically. Due to low hysteresis (<2K,<0.5T), the material has a potential for energy efficient refrigeration and actuation uses. The acoustic phonon properties of the $Gd_5(Si_2Ge_2)$ single crystals, grown by tri-arc pulling technique were studied by echo-pulse ultrasonic probing. For the first time we have measured room temperature velocities of longitudinal and transverse sound waves. The measured diagonal elastic constants in the monoclinic phase are: $c_{33} = 1.36 \times 10^{12}, c_{44} = 5.17 \times 10^{11}, c_{55} = 3.39 \times 10^{11}$dyne/cm^2. Here x and z are Cartesian axes parallel to crystallographic directions a and c; the later coincides with a two-fold rotation axis of the crystal.Work in Ames is supported by the US DOE.Work in NHMFL is supported by the In-House Research Program, NSF and State of Florida.

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