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Ultrasound Velocity Measurements in the Orbital-Degenerate Frustrated Spinel MgV_2O_4 TADATAKA WATANABE, TAKASHI ISHIKAWA, Department of Physics, College of Science and Technology (CST), Nihon University, Chiyoda, Tokyo 101-8308, Japan, SHIGEO HARA, Department of Physics, Chuo University, Bunkyo, Tokyo 101-8324, Japan, A.T.M. NAZMUL ISLAM, ELISA M. WHEELER, BELLA LAKE, Helmholtz Zentrum Berlin, GmbH, D-14109 Berlin, Germany — Magnesium vanadate spinel MgV_2O_4 is a geometrically frustrated magnet with t_{2g}-orbital degeneracy of V^{3+} ($3d^2$), which undergoes a cubic-to-tetragonal structural transition at $T_s = 65$ K and an antiferromagnetic (AF) transition at $T_N = 42$ K. For MgV_2O_4, it is considered that the occurrence of t_{2g}-orbital order at T_s causes the release of frustration by the AF ordering at T_N lower than T_s. We performed ultrasound velocity measurements in high-purity single crystal of MgV_2O_4. Temperature dependence of the tetragonal shear modulus $(C_{11} - C_{12})/2$ exhibits huge Curie-type softening in the cubic paramagnetic (PM) phase ($T > T_s$), which should be a precursor to the cubic-to-tetragonal lattice distortion at T_s. The trigonal shear modulus $C_{44}(T)$ exhibits softening with an upturn curvature in the cubic PM phase, indicating a coupling of the lattice to magnetic excitations. These softenings suggest the coexistence of the dynamical Jahn-Teller effect and the dynamical magnetic state in the cubic PM phase.

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