ANOMALOUS BEHAVIOR OF MAGNETOSTRICTION AT METAMAGNETIC PHASE TRANSITIONS IN MODEL ANTIFERROMAGNET $DyAlO_3$

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9.7 cm

Unusual static and dynamic behavior of low-temperature (1.5-4.2 K) magnetostriction of Ising Dy^{3+} ions in dipolar antiferromagnet $DyAlO_3$ at metamagnetic phase transitions induced by external magnetic fields along a- and b-axes (up to 5 T) was observed. The magnetostriction curves was found to be strongly dependent on the rate of rise and direction of change of the field showing odd-shaped hysteresis and dynamic enhancement of magnetostriction jumps. A ten-fold increase in the rate of field rise resulted in approximatively four-fold increase in magnetostriction jumps. It is interesting that the magnetostriction jumps had a maximum at $T > T_N$ when magnetic sublattices were not saturated fully and decreased practically to zero with further decreasing temperature. A theoretical model for explanation of such behavior taking into account nonuniform magnetic states of the sample due to the staggered field and "magnetocaloric focussing" of magnetostriction anomalies was proposed.

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