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Abstract

We report a study of the critical phenomena of perovskite-manganite compound $\text{La}_{0.6}\text{Pr}_{0.1}\text{Sr}_{0.3}\text{MnO}_3$ around the Curie temperature. Experimental results based on magnetic measurements using Banerjee criterion reveals that the sample exhibits a second-order paramagnetic-ferromagnetic transition. The critical behavior analysis and Kouvel-Fisher method suggests that the critical phenomena around the critical point can be correctly described by the 3D-Heisenberg model. Critical exponents were estimated and found $\beta = 0.354 \pm 0.009$ and $\gamma = 1.264 \pm 0.035$ at $T_C = 325.5 \pm 0.443$ K. The critical exponent δ is determined separately from the isothermal magnetization at T_C and evaluated to $\delta = 4.934 \pm 0.0004$. These critical exponents obey the Widom scaling relation $\delta = 1 + \gamma/\beta$. Based on the critical exponents, the magnetization-field-temperature (M - H - T) data around T_C collapses into two curves obeying the single scaling equation $M(H, \varepsilon) = |\varepsilon|^\beta f \pm \left(\frac{H}{|\varepsilon|^{\beta+\gamma}} \right)$ where $\varepsilon = (T - T_C)/T_C$ is the reduced temperature.

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