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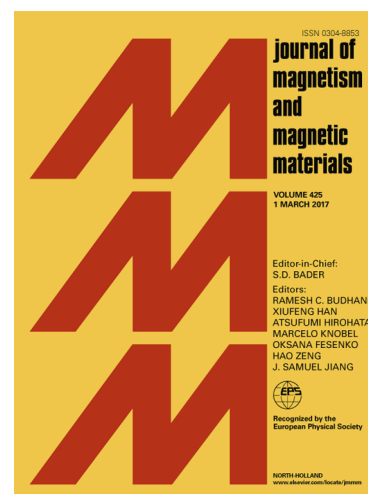
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Estimating spontaneous magnetization from mean field analysis and critical exponents study in $\text{La}_{0.6}\text{Sr}_{0.4}\text{Mn}_{0.9}\text{Al}_{0.1}\text{O}_3$ Compound.

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Abstract: The critical behavior of $\text{La}_{0.6}\text{Sr}_{0.4}\text{Mn}_{0.9}\text{Al}_{0.1}\text{O}_3$ compound was investigated based on the data of static magnetic measurements in the vicinity of its critical temperature T_C . Through various techniques such as modified Arrott plot, Kouvel-Fisher method and critical isotherm analysis, the estimated critical exponents were found to be $\beta = 0.45$, $\gamma = 1.1$, $\delta = 3.44$ at $T_C = 321$ K which is close to Mean-Field model values. The reliability of the critical exponents' values was confirmed by the Widom scaling relation and the universal scaling hypothesis. In order to estimate the spontaneous magnetization $M_S(T)$ at a given temperature, we used a process based on the analysis, in the mean-field theory, of the magnetic entropy change ($-\Delta S_M$) versus the magnetization data. An excellent agreement was found between the spontaneous magnetization determined from the entropy change ($-\Delta S_M$) vs. M^2) and the classical extrapolation from the Arrott curves ($\mu_0 H/M$ vs. M^2). Moreover, the local exponent n was studied in terms of the field dependence of the magnetic entropy change. It was noted that n evolves with field in the entire studied temperature range of our sample, indicating the validity of the mean-field theory for our compound.

Keywords: Critical behavior; Perovskite manganite; Critical exponent; Second-order transition; Local exponent.

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