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Domain Wall Structure and Electric Polarization in BiFeO_3

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Abstract content (Max 300 words) Formatting & Special chars

BiFeO_3 is a well-studied multiferroic material with distorted perovskite structure where electric polarization P parallel to $[111]$ and cycloidal spin order with the propagation vector Q perpendicular to $[111]$ directions (3-fold degenerate). Recently, an additional electric polarization P' accompanied by Q has been observed, which is proposed to be applied to a 3-state memory devices. We study a model which includes spin interactions and anisotropies to represent the magnetism of BiFeO_3 , and analyzed the model using Monte Carlo as well as LLG methods. The model reproduces magnetization curves as well as electric polarizations as a function of magnetic fields (cross-correlation curves). Spurious polarizations created by domain wall structures are also observed, which explains exotic features of the cross-correlation curves observed in BiFeO_3 .

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