

When A Magnetic Moment Is Subdivided, Do The Fragmented Moments Interact Among Themselves?

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It has been possible to improve the validity of point dipole approximation by appropriately subdividing the magnetic moment of a magnetized material to calculate the induced fields within the material and calculate the demagnetization factors by a convenient summation procedure (1). Subdividing has to be in such a way that the vectorial addition of the fragmented moments yields the total magnetic moment value to account for the entire extent of the material content. This is followed by distributing the subdivided moments over the entire sample. In such a case will there be an interaction among the fragments? This would entail accounting for induced fields at every fragment due to all the other fragments; and, also the corresponding interaction energy. One way to explain this process is to uphold that the subdivision is only hypothetical, and the boundaries between fragments are not real but only a mathematical convenience. On the other hand, the demagnetization factor by a summation procedure is possible only by this subdivision necessarily and the demagnetization factors obtained have physical significance. Hence it seems it has more basis to be inquiring whether a subdivision of this kind (which results in a physical quantity much closer to true value) must be so occurring that the interaction of a fragmented and distributed moment with all the other fragments must cancel out. A procedure to calculate such induced field values at a fragment would be reported and discussed for the above perspective.

References:

1. Proceedings of the 96th Indian Science Congress, 2009;
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