Domain Wall motion and Walker breakdown in bent nanowires

Trabalho #17

Apresentação Oral

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The description of domain wall (DW) dynamics along bent magnetic nanowires and nanotubes is a keystone for using these structures in spintronics based technologies. Indeed, proposed devices based on the concept of “race track memory” have curved segments. In this context, we aim to study the DW motion along bent wires. Using analytical and numerical calculations, we perform a detailed analysis of the DW motion along a bent nanowire described as a toroidal section. An analytical result is obtained in the limit of small curvatures, and the obtained motion equations allow us to predict two main regimes in the precession velocity of the DW, i.e., a Walker breakdown, which is not observed in straight nanowires. We show that the interplay between curvature and the external magnetic field plays an important role in the DW velocity. Indeed, we observe that small magnetic fields lead to an oscillatory behavior in the velocity while high magnetic fields yield a variable velocity, but in this case, the backward motion is not observed. A detailed analysis of the influence of curvature on the DW velocity is numerically performed, revealing the importance of the Walker limit for the motion of a DW along a bent nanowire and the appearance of the Walker Breakdown in bent wires is discussed.

Comentários adicionais

Este trabalho vem como uma continuação dos resultados publicados em “Oscillatory behavior of the domain wall dynamics in a curved cylindrical magnetic nanowire” (10.1103/PhysRevB.96.184401). Todos os resultados relevantes já foram obtidos e o artigo já está pronto para ser submetido em alguma revista A1, restando apenas os autores entrarem em consenso de qual é a melhor revista para o artigo.