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Micromagnetic Study of Magnetic Ringing Trapped at Nanocontact After Domain Wall Collision in Ferromagnetic Nanowire

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Control of magnetic domain pattern in patterned ferromagnetic media is important issue in spintronic application. Here, we investigate magnetic domain wall (DW) collision phenomenon in a ferromagnetic nanowire using micromagnetic simulation [1]. The two magnetic DWs are generated by fast pulsed magnetic field at the two ends of nanowire with pulse width of 1 ns. Two DWs are lauched from the end of nanowire and collide at center of the wire, where a long rectangle are positioned at the nanocontact, as illustrated in Fig. 1. Collision generates the spin wave followed by ringing of magnetization at the center. Interestingly, magnetic ringing behavior seems to be surviving longer as trapped in the rectangle at the center, compared to the case without rectangle. The magnetic ringing after DWs collision is analyzed with detailed investigation of magnetic energies, as in Fig. 2.

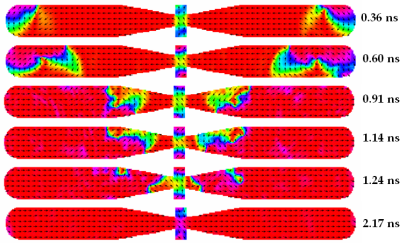

Fig. 1.

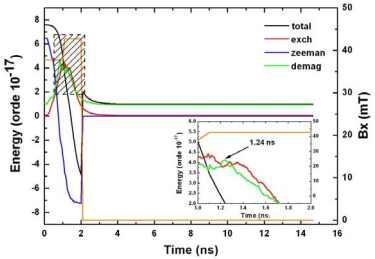

Fig. 2.

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Flow Analysis of Non-Newtonian Blood in a Magnetohydrodynamic Pump

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Abstract: The magnetohydrodynamic (MHD) pump has attracted a lot of attention in today's technology especially for biotechnology and drug delivery application. In a magnetohydrodynamic pump, the magnetic field creates a dynamic force that moves the fluid forward. The knowledge of the flow field is mandatory for design of a magneto hydrodynamic pump. The purpose of this study is to numerically investigate the blood, as a non-Newtonian fluid, flow field distribution in a magnetohydrodynamic pump. A power law model for blood viscosity is utilized. To solve the non-linear governing differential equations, momentum and Maxwell equations, a CFD code based on finite volume is utilized. Results show a maximum value of velocity for different values of magnetic flux density (B) and current (I).

Keywords: MHD pump, blood, non-Newtonian fluid, magnetic flux density, velocity distribution.