Abstract Submitted
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Anomalous field dependence of magnetoresistance in magnetic multilayers based on the Fibonacci sequence[1] LEONARDO DANTAS MACHADO, CLAUDIONOR GOMES BEZERRA, MARCIO ASSOLIN CORREA, CARLOS CHESMAN, Departamento de Fisica Teorica e Experimental - UFRN, Brazil, JOHN E. PEARSON, AXEL HOFFMANN, Materials Science Division, Argonne National Laboratory, USA — The discovery of giant magnetoresistance and concomitant effects such as oscillatory exchange coupling in magnetic multilayers was the starting point of the spintronics era. In the present study, a multilayer of Fe and Cr was designed, using the Fibonacci sequence for the growth of the non-magnetic spacers. Using the gradient method we simulated the magnetic field dependence of these nanostructures for in-plane magnetic fields. The simulations included magnetocrystalline anisotropy for the [100] and [110] directions, as well as bilinear and biquadratic exchange coupling. The resultant magnetization and magnetoresistance behavior shows unusual behavior, such as a Devil's staircase for the magnetization and increasing magnetoresistance with increasing applied magnetic fields. When the ratio of the biquadratic to bilinear coupling exceeds 30% the magnetic field response is expected to show even fractal behavior. These numerical simulations will also be compared to experimental measurements on samples prepared with nominally the same thicknesses.

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