Non-uniform FFT Algorithm for Magnetostatic Field Evaluation in FASTMAG

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This presentation demonstrates the performance of the FastMag, a high-performance micromagnetic simulator developed in the Computational Electromagnetics and Micromagnetics group at CMRR and Dept. of ECE, UCSD. FastMag is able to handle at a high speed ultra-complex magnetic devices with tens to hundred degrees of freedom.

The high performance of FastMag is based on efficient methods for evaluating the effective fields and high-performance implementations on massively parallel Graphics Processing Unit computing systems. In particular, FastMag implements a new non-uniform fast Fourier transform (NUFFT) algorithm and non-uniform grid interpolation method (NGIM). In particular, NUFFT algorithm has $O(N\log N)$ computational complexity for general spin distributions with small overhead constants, controllable errors, and it is very well suited for extremely suitable for parallelization. The current NUFFT code shows very good performance of a single GPU. A multi-GPU version of the code is being implemented. A discussion on this implementation and some preliminary results will be shown.