

Abstract Submitted  
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**Machine Learning Magnetic Parameters from Hysteresis Loops<sup>1</sup>**

BRADLEY FUGETTA, Georgetown University, KUN YUE, Nvidia Corp., AMY LIU, GEN YIN, Georgetown University — First-order reversal curve (FORC) hysteresis loops of a magnetic material contain detailed information about the underlying physics of the material, but can the materials magnetic Hamiltonian parameters be extracted from this data? Though it is impossible for humans to accurately guess the magnetic parameters from FORC data, we hypothesize that a trained neural network can do so. We have generated over 10,000 images of FORC data using mumax<sup>3</sup>, a micromagnetics simulation program, and are using that dataset to try to train a customized convolutional neural network (CNN) to estimate magnetic parameters solely from FORC images. We trained the CNN with various loss functions, output distributions, and network shapes to tune the hyperparameters for this particular problem. The neural network shows clear signs of learning and is capable of estimating the saturation magnetization. We continue to tune the hyperparameters of our CNN to lower the error on its predictions, and we hope to train the CNN to predict other Hamiltonian parameters to the same accuracy as the saturation magnetization.

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