The goal of the Data Reconstruction project is to determine whether or not information recorded on a partially erased magnetic disk can be recovered from a magnetic scan of the disk surface. To that end, work has been done first to determine how to recover data from a properly formatted hard disk via magnetic means. To simplify the task, a specially formatted hard disk, upon which a known periodic bit pattern based upon a maximum-length pseudorandom sequence was directly recorded, was acquired from Seagate. Using a Magnetic Force Microscope (MFM), digital images of the magnetization pattern on the surface of the hard disk were obtained, and from these a signal analogous to a readback signal from a read head was extracted using MATLAB. Since the pattern was deliberately written on the hard disk without first being scrambled or coded as would be the situation in real drive, it is known exactly what pattern of bits is represented by the magnetization pattern on the disk. This will allow the validation of the recovery method used by comparing the known sequence to the sequence that is extracted from the MFM images. The response of the MFM probe, which acts like the read head in this experiment, can be modeled by a simple smoothing function which, when applied to the known two-level write signal corresponding to the recorded pattern, produced an image that closely approximated the MFM image. Thus, it is believed that passing the extracted readback signal through a simulated read channel with equalization and detection techniques should be able to recover the recorded pattern from the MFM scan.

Illustration 2: MFM scan of magnetization pattern

Illustration 1: Simulated MFM image obtained by smoothing waveform