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Magnetic Force Microscopy Study on Wide Adjacent Track Erasure in Perpendicular Magnetic Write Heads

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One of significant problems limiting the performance of perpendicular magnetic write heads is wide adjacent track erasure (WATER), causing stored data near and also far from a written track being erased. Understanding WATER mechanisms and its locations is crucial both for design and process engineers. Typically, the presence of WATER in magnetic write heads is monitored using a spin-stand technique; however, it cannot accurately identify sources and locations where WATER is presented on magnetic write heads. In this paper, a phase-contrast magnetic force microscopy (MFM) was used to observe and analysis the failure of magnetic write heads due to the WATER problem. During MFM imaging, the magnetic write head was energized by a DC current. The induced out-of-plane magnetic field was then detected by scanning a MFM probe across the surface of the magnetic write head. MFM images were then mapped with experimental results from WATER measurement by the spin-stand. Results revealed that WATER can be created by several factors, i.e. the structure of magnetic domains and walls from material discontinuities and the magnetic field leakage at different locations on magnetic write heads.

Keywords: far track interference, adjacent track interference, magnetic recording heads, WATER, MFM

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