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Computer Simulation of Recording Characteristics with Trimmed Planar-Type Head

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1. Introduction

The density of magnetic recording has been increasing at a very fast rate for the last several decades. A further increase of the density is more and more difficult because of the thermal fluctuation problem. One way to avoid this problem is to use media with high magnetocrystalline anisotropy (and hence high coercivity). This requires a write head, which can generate a high write field. A planar-type head, which enables to generate much higher write field than conventional heads, is suitable for this purpose.

In this work, we studied about design optimization of planar type head in order to high density recording by decreasing of track width. To investigate this effect, we employed trimming technique by changing the values of a, b and c (see Fig.1). We also compared recording characteristics between untrimmed planar-type head and trimmed planar-type head

2. Experiment

A schematic illustration of planar type head is shown in Fig.1. Some important head parameters are: the gap length of 0.12 μm, the track width of 0.16 μm; the relative permeability of 500, and the saturation flux density of 1.9 T, and the magneto-motive force of 0.4 A·Turn. The field profile was calculated with FEM (Finite Element Method).

A two dimensional array of hexagons was used to the longitudinal media. The grain size (D) is 7 nm and the thickness is 13 nm. The simulations were carried out in a lattice of 128 × 64 μm, which corresponds to the medium area of 0.896 × 0.388 μm^2. The each grain was assumed to posses only uniaxial crystalline anisotropy, and its easy axis was 2-D random.

3. Results and Discussion

In fig.1 shows the schematic illustration of planar type head. We determined the optimum trimmed planar type head with trimming by changing the value of a, b, c. The optimum value of a, b, c are 0.24 μm, 0.4 μm, 0.4 μm.

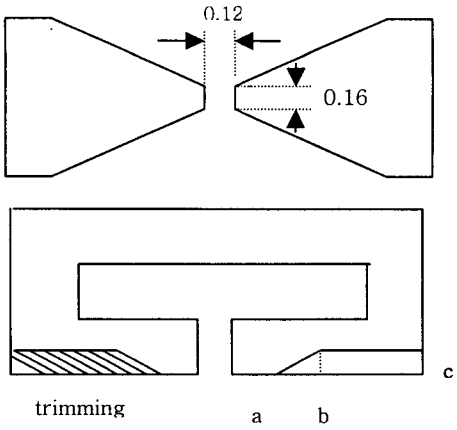

Fig.1 The schematic illustration of the planar type head

In figs.2.3 shows the result for the recorded bit pattern for the trimmed head and untrimmed head in the same bit density and ratio of maximum gap field to anisotropy field. The bit patterns at the trimmed head are less curved and the track widths are less than the untrimmed head.

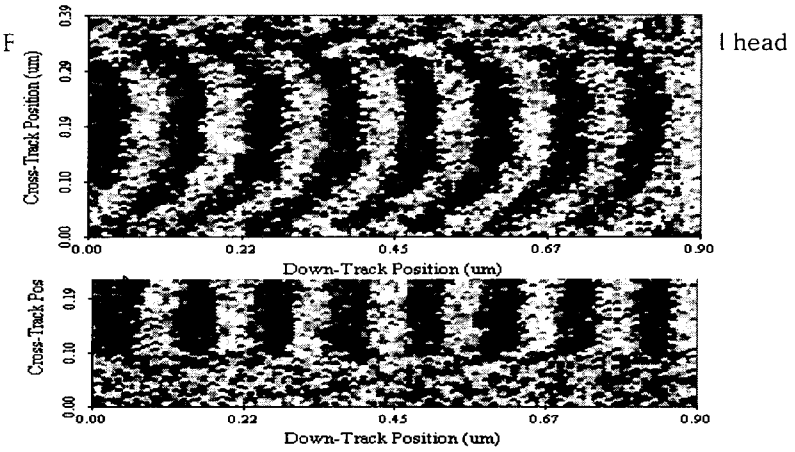

Fig.3 The result for the recorded bit pattern for the trimmed head

4. Reference

[1] K. Yasuna, K. Usui and T. Yamaguchi " IEEE Trans. Magn. 35, 2265 ~ 2267