Bit error rate comparison of island patterns for bit-patterned media recording

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In this paper, we investigate the performance of BPMR according to the spacing and position of islands. To evaluate the performance in accordance with island distribution, Fig. 1 shows three structures of patterned media according to the position of islands. Fig. 1 (a) (Case (1)) represents an array of typical islands which distributed over a square lattice model. Islands along the main track immediately adjoin islands along the upper and lower track in this lattice. Fig. 1 (b) (Case (2)) represents the arrangement of islands that distributed over hexagonal lattice pattern [1]. Islands along the main track adjoin the half-delayed islands along the upper and lower track in this hexagonal lattice. Fig. 1 (c) (Case (3)) represents the arrangement of islands that distributed over hexagonal lattice pattern and are spaced equally. Islands along the main track adjoin the equally distant islands along the upper and lower track in this hexagonal lattice. The difference between Fig. 1 (b) and Fig. 1 (c) is the spacing between the main track and the adjacent tracks. Fig. 2 shows bit-error rate (BER) performance of island distribution according to SNR when $d1=d2=18$ nm and $d3=19.3$ nm for 2 Tb/in^2. Since the influence of adjacent tracks of Case (2) is less than that of Case (1), i.e., the effect of ITI is reduced, Case (2) shows the best performance. Case (3) has the structure similar to Case (2), but the distance between adjacent tracks is reduced by making the distance among islands be the same, which makes the density higher than that of Case (2). However, Case (3) is still better than Case (1).
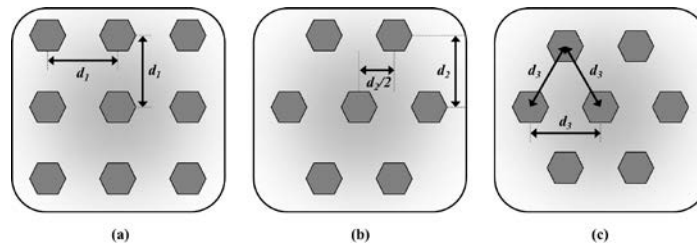

Figure 1. Structures of patterned media according to the position of islands.
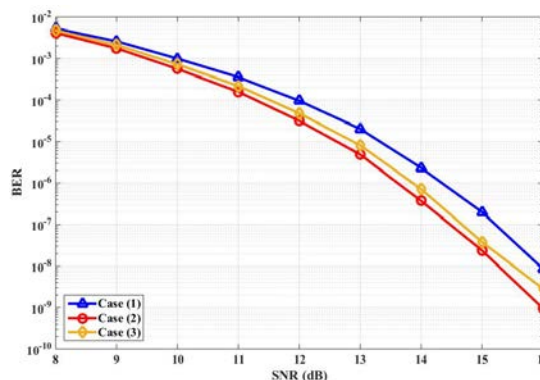

Figure 2. BER performance of island distribution according to SNR.

[1] P. W. Nutter, I. T. Ntokas, B. K. Middleton, and D. T. Wilton, "Effect of island distribution on error rate performance in patterned media," IEEE Trans. Magn., vol. 41, no. 10, pp. 3214–3216, Oct. 2005.