

A Comparative Experimental Study on Head-Disk Touch-Down Detectability Based on Off-Track Vibration

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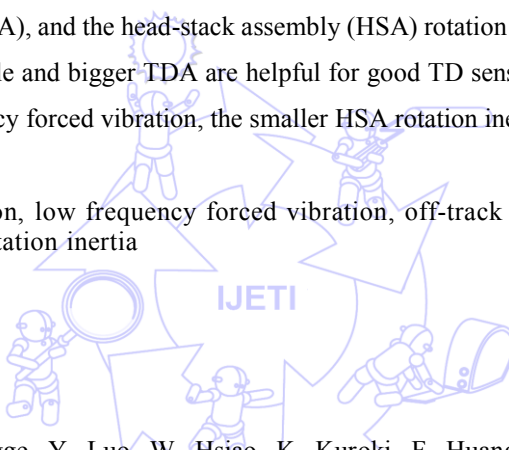
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Abstract

To further increase the hard-disk drive's areal density, the head-disk spacing needs to be reduced to sub 1 nm and it requires accurately detect the head-disk touch down (TD). The off-track-vibration-based TD detection methods are widely applied in current hard-disk drive (HDD) for head-disk TD detection. However, few studies perform on how to improve the off-track-vibration-based TD detection sensitivity. In this paper, a comparative experimental study was conducted between comparative two off-track-vibration-based TD detection methods: one is based on the low-frequency-forced vibration; the other is based on the off-track-structure vibration. Besides, the skew angle, touch down area (TDA), and the head-stack assembly (HSA) rotation inertia effects on TD detectability were discussed. Bigger skew angle and bigger TDA are helpful for good TD sensitivity for these two methods. To the method based on low frequency forced vibration, the smaller HSA rotation inertia design is also helpful.

Keywords: touch down detection, low frequency forced vibration, off-track structure vibration, skew angle, touch down area, rotation inertia

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