High TPI HDD 구현을 위한 PES Estimation에 관한 연구

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A Study on the PES Estimation for Developing High-TPI HDD

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Key Words : Hard Disk Drive(HDD), PES(Position Error Signal), Torque Disturbance, Displacement Disturbance, Error Transfer Function

Abstract : A frequency-domain PES estimation and its prediction method are proposed for the tightly-coupled servo/mechanical design of high-TPI HDD system above 100kTPI. The major two disturbance energies which are related with mechanical vibrations inside of HDD are used to predict the drive-level PES, while considering closed-loop servo dynamics. One is the torque disturbance which mainly comes from aerodynamic excitation of HSA system and the other is the displacement disturbance from disk-spindle dynamics. In order to obtain the accurate error transfer function of closed-loop servo control, the plant model is measured by accurate experiment. The measured PES and predicted one are compared in terms of frequency-domain PES spectrum and its standard variation value. It is proved that the proposed frequency-domain PES estimation/prediction method is capable of predicting drive-level PES of high-TPI hard disk drive.

감도해석 및 순차적 선형계획법을 이용한HDD 서스펜션의 형상 최적화

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Optimization of HDD Suspension Shape Using Sensitivity Analysis and Sequential Linear Proframing

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Key Words : HDD(하드 디스크 드라이브), Sensitivity analysis(감도해석), SLP(순차적 선형계획법)

Abstract : The main obstacle to high track density in HDD id the structural resonances of the suspension. The most critical mode is sway mode and second torsion mode, when a data is read and written. It is common fact that the effect of two modes is smaller when a thickness is bulky. But the stiffness of suspension is smaller, the slider can follow a disk better. Because these two fact are reciprocal, a compromise is needed. So we investigated another method to improve band width without changing of the thickness of suspension but with changing of the shape. In this paper, we use two method - Sensitivity analysis and SLP using ADS. And we obtain the optimized valu close to target value.