Abstract:

This paper considers two novel controller synthesis methodologies using a feedforward control structure for performing concentric self-servo track writing in hard disk drives. In the first methodology, it is assumed that a conventional causal track-following controller has been designed and a non-causal feedforward controller, which utilizes the stored error signal from writing the previous track, is designed using standard $H\infty$ control synthesis techniques, in order to prevent the track errors from propagating and to achieve good disturbance attenuation. In the second methodology, both the track-following feedback controller and the feedforward controller are simultaneously designed via a mixed $H2/H\infty$ control scheme, which involves the solution of a set of linear matrix inequalities and achieves good disturbance attenuation while preventing the propagation of track errors from the previous tracks. Simulation results confirm that the two proposed control synthesis methodologies prevent error propagation from the previously written tracks and significantly improve concentric self-servo track writing performance.