Abstract:

This paper discusses the design and implementation of H2 guaranteed cost control for dual-stage hard disk drive track-following servo systems. The proposed approach is based on H2 guaranteed cost analysis, in which an upper bound on the worst-case H2 performance of a discrete-time system with gain-bounded unstructured uncertainty is determined via several Riccati equations. Subsequently, the output feedback H2 guaranteed cost control synthesis algorithm is presented by exploiting Riccati equation structure to reduce the number and complexity of the semi-definite programs (SDPs) that need to be solved. The presented control synthesis methodology is then applied to a hard disk drive with a PZT-actuated suspension. Experimental results on the actual disk drive validate our control design.