H_∞ Control Design for an Adaptive Optics System.

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Abstract: In this paper we first present a full order H_∞ controller for a multi-input, multi-output (MIMO) adaptive optics system. We apply model reduction techniques to the full order H_∞ controller and demonstrate that the closed-loop (CL) system with the reduced order H_∞ controller achieves the same high level of performance. Upon closer examination of the structure of the reduced order H_∞ controller it is found that the dynamical behavior of the reduced order H_∞ controller can be accurately approximated by a single-input, single-output (SISO) transfer function (TF) multiplied by the inverse of the adaptive optics plant dc gain. This observation then leads to a general design methodology which only requires the synthesis of a SISO H_∞ controller and multiplication by constant matrices.

Keywords: