Low-Authority Controller Design via Convex Optimization

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In this paper we address the problem of low-authority controller (LAC) design. The premise is that the actuators have limited authority, and hence cannot significantly shift the eigenvalues of the system. As a result, the closed-loop eigenvalues can be well approximated analytically using perturbation theory. These analytical approximations may suffice to predict the behavior of the closed-loop system in practical cases, and will provide at least a very strong rationale for the first step in the design iteration loop. We will show that LAC design can be cast as convex optimization problems that can be solved efficiently in practice using interior-point methods. Also, we will show that by optimizing the l1 norm of the feedback gains, we can arrive at sparse designs, *i.e.*, designs in which only a small number of the control gains are nonzero. Thus, in effect, we can also solve actuator/sensor placement or controller architecture design problems.