

Maximizing the Closed Loop Asymptotic Decay Rate for the Two-Mass-Spring Control Problem

Didier Henrion^{1,2}

Michael L. Overton³

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Abstract

We consider the following problem: find a fixed-order linear controller that maximizes the closed-loop asymptotic decay rate for the classical two-mass-spring system. This can be formulated as the problem of minimizing the abscissa (maximum of the real parts of the roots) of a polynomial whose coefficients depend linearly on the controller parameters. We show that the only order for which there is a non-trivial solution is 2. In this case, we derive a controller that we prove locally maximizes the asymptotic decay rate, using recently developed techniques from nonsmooth analysis.

¹LAAS-CNRS, 7 Avenue du Colonel Roche, 31077 Toulouse, France

²Department of Control Engineering, Faculty of Electrical Engineering, Czech Technical University in Prague, Technická 2, 166 27 Prague, Czech Republic. Email: henrion@laas.fr.

³Courant Institute of Mathematical Sciences, New York University, 251 Mercer St., New York, NY, USA. Email: overton@cs.nyu.edu.