ROBUST STRUCTURAL CONTROL DESIGN USING GENERALIZED SEMI-INFINITE MIN-MAX OPTIMIZATION

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ABSTRACT

We present a robust structural control system design method for a set of the critical excitations. The control system design problem is formulated as a generalized semi-infinite min-max problem and solved by an adaptive approximation algorithm. The critical excitations, which generally account for inherent uncertainties in predicting forthcoming events such as earthquake and wind, are modeled as a parameterized input filter. Decentralized static output feedback is used for fixed structure controller design. A simple numerical example demonstrates the viability of the proposed method.

INTRODUCTION

We consider a controller synthesis problem in the form

$$\min_{x \in R^n} \psi(x) \tag{1}$$

where $\psi : R^n \to R$ is defined by

$$\psi(x) \equiv \max_{y \in Y} \left\{ \left\| G(x, y; s) \right\|_2 \middle| f(x, y) \le 0 \right\} \tag{2}$$

with $Y \equiv \left\{ y \in R^m \middle| g(y) \le 0 \right\}$, where $x \in R^n$ and $y \in R^m$ represent control design variables and excitation filter variables, respectively.

This problem can be considered as a class of generalized semi-infinite min-max problems. In this paper, we use an adaptive approximations and exact penalization methods in order to solve the min-max problem.

REFERENCES

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