Exercise 1 in Robust Multivariable Control

Anders Helmersson
Department of Electrical Engineering
Linköpings universitet
SE-581 83 Linköping, Sweden
http://www.control.isy.liu.se
email: andersh@isy.liu.se

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1 Introduction

This excerice contains four examples from the COMPl$_e$ib's benchmarks [1]. The models are available at

https://users.isy.liu.se/rt/andersh/teaching/example5.m

2 Exercise

Try to find a controller for each plant that achieves the best $H\infty$ norm, γ. Answer the following questions for each problem.

(i) What is the best performance, γ.

(ii) What is limiting in performance? Which condition comes into play?

(iii) What happens with the controller when get close to the optimial γ?

Table 1: Examples

Case	n	nmeas	ncon	r	γ
AC3	5	4	2		
AC9	10	5	4		
TF1	7	4	2		
NN16	8	4	4		

(iv) Try to reduce the order of the controller (r). Is the controller sensitive to variations?

(v) Is the design problem well formulated? What may be missing?

References

[1] F. Leibfritz. Compleib: Constraint matrix-optimization problem library – a collection of test examples for nonlinear semidefinite programs, control system design and related problems. Technical report, Department of Mathematics, University of Trier, Trier, Germany, 2004.