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STATIC OUTPUT FEEDBACK REVISITED*

Adrian-Mihail Stoica† Isaac Yaesh‡

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Abstract

The synthesis problem of static output feedback controllers within the anisotropic-norm setup is revisited. A tractable synthesis approach involving iterations over a convex optimisation problem is suggested, similarly to existing results for the H_∞-norm minimisation case. The results are formulated by a couple of Linear Matrix Inequalities coupled via a bilinear equality, revealing, as in the H_∞ case the duality of between the control-type and filtering type LMIs and allowing a tractable iterative method to cope with practical static output feedback synthesis problems. The resulting optimisation scheme is then applied to a flight control problem, where the merit of the anisotropic norm setup is shown to provide a useful trade-off between closed loop response and feedback gains.

MSC: 37N35, 37N40, 39A30, 93C55

keywords: Discrete-time linear systems, static output feedback, stability, anisotropic norm, boundedness conditions, positive semidefinite programming, H_∞-norm

1 Introduction

The problems of optimal control and filtering received much attention over the years. Solutions for these problems were presented by Kwakernaak and Sivan [10]. Modelling errors were considered in [16]. When the external input signals are of white noise type, H_2-norm minimisation is applied, leading to the Kalman filter [6] and Linear Quadratic Gaussian (LQG) control.

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†adrian.stoica@upb.ro University "Politehnica" of Bucharest, Faculty of Aerospace Engineering, Str. Polizu, No. 1, 011063, Bucharest, Romania

‡itzhak.yaesh@elbitsystems.com Elbit Systems Ltd. P.O.B 1044/77 Ramat Hasharon 47100, Israel