

## STATIC OUTPUT FEEDBACK REVISITED\*

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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  $H_\infty$ -norm minimisation case. The results are formulated by a couple of Linear Matrix Inequalities coupled via a bilinear equality, revealing, as in the  $H_\infty$  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,  $H_\infty$ -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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