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The Impact of Model Approximation in Multiparametric Model Predictive Control

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Abstract

Incorporating a high fidelity model that accurately describes a dynamical system in a model predictive control study may often lead to an intractable formulation where the use of model approximation is required. This study examines system identification, time series modeling, and linearization in the context of multiparametric model predictive control with the use of key error metrics including: (i) a novel comparison of key features of the feasible space and objective function in the optimization formulation, (ii) integral time absolute error, (iii) error distribution analysis, and (iv) step response profiles. Two examples are used as a basis for this study: a tank system which highlights the techniques used and a Continuously Stirred Tank Reactor (CSTR).

Keywords: Multiparametric programming, Model Predictive Control, Model Validation

1 Introduction

¹ Model Predictive Control (MPC) is a growing field in the academic and industrial commu-
² nities for more than three decades now[1, 2, 3]. In recent years, more advanced models are

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