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MLD SYSTEMS: MODELING AND CONTROL

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Abstract. In this work, we present results of the modeling and control of a hydraulic pilot process. The system is described by a set of linear equalities and inequalities involving both, real and integer variables and the dynamics and logic decisions are heavily inter dependent. Hence the characterization as a Mixed Logic Dynamic (MLD) system. The model obtained is particularly suited to a Model Predictive Control (MPC) strategy to command the system. Results of a simulation of the closed loop system are feature.
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1 Introduction

In this notes, we present results of the modeling and control of a hydraulic pilot process.

The system was devised in order to have a test bench for a wide variety of control experiences including automata and experiments integrating logic, dynamics and constraints. We will focus here in this last subject.

MLD systems are described by linear inequalities involving both, real and integer variables [2] and the dynamical and logical decisions are heavily inter dependent. This is the case of the pilot process under study.

There are several approaches to handle the discrete component of MLD systems. Some, set hierarchical levels, leaving the continuous variables in the lower ones and the discrete (decisions) variables at the higher levels [9].

Other framework, such as [2] and [8], profit from the fact that propositional logic involving both continuous and discrete variables may be transformed into linear inequalities. Consequently, a model of the evolution of the system may be written, including the restrictions imposed by the decisions (the discrete variables) and where other operating constraints may be simply added to the problem.

Once in this framework, techniques such as MPC [5] may be used in order to control the system. The singularity being that mixed integer optimization techniques are to be used. We recall that in the MPC approach an optimal