

STABILIZATION OF COMPLEX MANUFACTURING SYSTEMS WITH STATE IMPULSIVENESS BY HYBRID SLIDING MODE CONTROL

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Abstract. This paper proposes a hybrid sliding mode controller to stabilize a complex manufacturing system with impulsive phenomena. Newly developed sufficient conditions ensure the proposed control to effectively work on the multi-mode manufacturing system. A manufacturing/re-manufacturing system is presented as an example to show the effectiveness of the proposed controller. Numerical solutions are developed to set up the controller to govern the two mode manufacturing system. The designed manufacturing control strategy will help produce various products in a timely manner to keep up with the demands and shorten the delay in current competitive and global market.

Keywords. Impulsive state, Lyapunov functional, manufacturing system, re-manufacturing, sliding mode.

AMS (MOS) subject classification: 37C75, 37B25, 37N35.

1 Introduction

Systems modeling of a manufacturing system plays an important role in understanding stability impact of decision making on the value function of the manufacturing model. Its aim is to understand the behaviors of the production process and to effectively control the flows of output, goods and information [3], [9]. In order to run smoothly, the manufacturing system's stability must be ensured. Otherwise, the manufacturing plant will not be operated normally if system stability is not guaranteed. When the system does not have these stability properties, then it will experience unexpected manufacturing dynamics [9]. Furthermore, if a chaotic or irregular behaviour is not controlled, it results in fluctuation of the processing [5].

Demand fluctuations raised by globalization and intense competition in the market require to design various control policies to make a manufacturing system stable. Thus, the stabilized manufacturing system can produce products