Adaptive Control of Web Guides

Article

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Abstract

Web guides are mechanisms that are used in roll-to-roll material processing machines to control the lateral position of the material while it is transported over rollers in processing machinery; the flexible, continuous materials are often referred to in the industry as “webs”. The process of controlling the lateral position of webs on rollers is referred to as “web guiding”. With the increasing need to transport and process different types of materials under different operating conditions within the same processing machinery, the existing fixed gain control algorithms do not provide adequate performance under these changing conditions and must be re-tuned often to provide satisfactory guiding performance. A controller that will adapt to parameter changes resulting from changes in the material properties, operating conditions, and size and type of guide mechanisms is desired. This paper discusses the design and implementation of model-based adaptive control strategies for web guides based on the dynamic models which describe the lateral behavior of webs. Extensive experiments are conducted for the designed adaptive control strategies for two types of web guides, namely remotely pivoted guide and offset pivot guide. Practical implementation issues and methods to increase robustness of the adaptive strategies are discussed. Experimental results from the adaptive control strategies will be compared with the existing fixed gain PI controller.

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