

1. Record Nr.	UNINA9910454317303321
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Titolo	Synchronization of mechanical systems [[electronic resource] /] / Henk Nijmeijer, Alejandro Rodriguez-Angeles
Pubbl/distr/stampa	Singapore ; ; River Edge, NJ, : World Scientific, c2003
ISBN	1-281-93544-1 9786611935443 981-279-497-2
Descrizione fisica	1 online resource (219 p.)
Collana	World Scientific series on nonlinear science. Series A ; ; vol. 46
Altri autori (Persone)	Rodriguez-AngelesAlejandro
Disciplina	621.3133
Soggetti	Robots - Control systems Synchronization Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. 197-202) and index.
Nota di contenuto	Contents ; Preface ; 1. Introduction ; 1.1 General introduction ; 1.2 Synchronization ; 1.3 Synchronization in robotic systems ; 1.3.1 Velocity and acceleration measurements ; 1.3.2 Joint flexibility ; 1.3.3 Friction phenomena ; 1.4 Problem formulation 1.4.1 External synchronization of rigid joint robots 1.4.2 External synchronization of flexible joint robots ; 1.4.3 Mutual (internal) synchronization of rigid joint robots ; 1.5 Scope of the book ; 1.6 Outline of the book ; 2. Preliminaries 2.1 Mathematical preliminaries and stability concepts 2.1.1 Basic definitions ; 2.1.2 Lyapunov stability ; 2.1.3 Stability of perturbed systems ; 2.2 Dynamic models of robot manipulators ; 2.2.1 Rigid joint robots ; 2.2.2 Flexible joint robots 2.2.3 Properties of the dynamic model of the robots 2.2.4 Friction phenomena ; 2.3 Experimental setup ; 3. External synchronization of rigid joint robots ; 3.1 Introduction ; 3.2 Synchronization controller based

on state feedback

3.3 Synchronization controller based on estimated variables

3.3.1 Feedback control law ; 3.3.2 An observer for
the synchronization errors ; 3.3.3

An observer for the slave joint variables

; 3.3.4 Synchronization closed loop error dynamics

; 3.3.5 Stability analysis

3.4 Gain tuning procedure

Sommario/riassunto

The main goal of this book is to prove analytically and validate experimentally that synchronization in multi-composed mechanical systems can be achieved in the case of partial knowledge of the state vector of the systems, i.e. when only positions are measured. For this purpose, synchronization schemes based on interconnections between the systems, feedback controllers and observers are proposed. Because mechanical systems include a large variety of systems, and since it is impossible to address all of them, the book focuses on robot manipulators. Nonetheless the ideas developed here can be
