

1. Record Nr.	UNINA9910877635503321
Titolo	Control of synchronous motors // edited by Jean-Paul Louis
Pubbl/distr/stampa	London, : ISTE Hoboken, N.J., : Wiley, 2011
ISBN	9781118601785 1118601785 9781118601730 1118601734 9781118601747 1118601742 9781299187597 1299187595
Edizione	[1st edition]
Descrizione fisica	1 online resource (431 p.)
Collana	ISTE
Altri autori (Persone)	LouisJean-Paul <1945->
Disciplina	621
Soggetti	Actuators - Automatic control Synchronization
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 and index.
Nota di contenuto	Cover; Title Page; Copyright Page; Table of Contents; Introduction; Chapter 1. Synchronous motor controls, Problems and Modeling; 1.1. Introduction; 1.2. Problems on the synchronous motor control; 1.2.1. The synchronous motor control, a vector control; 1.2.2. Direct/inverse model and modeling hypotheses; 1.2.3. Control properties; 1.3. Descriptions and physical modeling of the synchronous motor; 1.3.1. Description of the motor in preparation for its modeling; 1.3.2. Hypotheses on the motor; 1.3.3. Notations; 1.3.4. Main transformation matrices; 1.3.5. Physical model of the synchronous motor 1.3.6. The two levels voltage inverter1.3.7. Model of the mechanical load; 1.4. Modeling in dynamic regime of the synchronous motor in the natural three-phase a-b-c reference frame; 1.4.1. Model of the machines with non-salient poles and constant excitation; 1.4.2. Exploitation of the model in the a-b-c reference frame in sinusoidal

steady state, electromagnetic torque; 1.4.3. Extensions to the case of non-sinusoidal field distribution machines

1.5. Vector transformations and dynamic models in the  $\alpha$ - $\beta$  and  $d$ - $q$  reference frames (sinusoidal field distribution machines with non-salient and salient poles)

1.5.1. Factorized matrix modeling; 1.5.2. Concordia transformation:  $\alpha$ - $\beta$  reference frame; 1.5.3. Park transformation, application to the synchronous salient pole motor; 1.5.4. Note on the torque coefficients; 1.6. Can we extend the Park transformation to synchronous motors with non-sinusoidal field distributions?; 1.7. Conclusion; 1.8. Appendices; 1.8.1. Numerical values of the parameters; 1.8.2. Nomenclature and notations 1.8.3. Acknowledgments

1.9. Bibliography; Chapter 2. Optimal Supply and Synchronous Motors Torque Control: Designs in the  $a$ - $b$ - $c$  Reference Frame; 2.1. Introduction: problems of the controls in  $a$ - $b$ - $c$ ; 2.2. Model in the  $a$ - $b$ - $c$  reference frame: extension of the steady state approach in transient regime; 2.2.1. Case of sinusoidal field distribution machines; 2.2.2. Case of trapezoidal field distribution machines (brushless DC motor); 2.2.3. Note on the electromagnetic torque for non-sinusoidal machines; 2.3. Structures of torque controls designed in the  $a$ - $b$ - $c$  reference frame

2.3.1. Case of the sinusoidal distribution machine 2.3.2. Extension to brushless DC motors (case of trapezoidal field distribution machines); 2.4. Performances and criticisms of the control approach in the  $a$ - $b$ - $c$  reference frame; 2.4.1. Case of a proportional control; 2.4.2. Case of an integral and proportional (IP) current regulation; 2.4.3. Interpretation in Park components of the IP controller designed in  $a$ - $b$ - $c$ ; 2.4.4. Advanced controllers: example of the resonant controller; 2.4.5. Interpretation by Park transformation of the regulation by resonant controller

2.5. Generalization: extension of the supplies to the case of non-sinusoidal distribution machines

---

## Sommario/riassunto

Synchronous motors are indubitably the most effective device to drive industrial production systems and robots with precision and rapidity. Their control law is thus critical for combining at the same time high productivity to reduced energy consumption. As far as possible, the control algorithms must exploit the properties of these actuators. Therefore, this work draws on well adapted models resulting from the Park's transformation, for both the most traditional machines with sinusoidal field distribution and for machines with non-sinusoidal field distribution which are more and more used in

---