(1)

Elimination of imbalance vibrations in magnetic bearing systems using discrete-time gain-scheduled Q-parametrization controllers

Mohamed, A.M.; Hassan, I.M.M. ; Hashem, A.M.K.

Abstract:

We propose a method to eliminate the imbalance vibrations in magnetic bearing systems using discrete-time gain-scheduled Q-parametrization controllers. Imbalance in rotating machines generates variable frequencies sinusoidal disturbance forces that cause the vibrations. Since the frequency of vibrations equals the rotational speed, the free parameter Q of the Q-parametrization controllers is scheduled as a function of the rotational speed to achieve rejection of the imbalance sinusoidal disturbance forces at all operating speeds. First, we present a mathematical model for the magnetic bearing in state space from which includes the effect of imbalance. Next, we explain the discrete-time Q-parametrization controller design for the magnetic bearing to achieve robust stability mid rejection of the variable frequencies sinusoidal disturbance forces. Finally, several simulation results are presented. The results showed that elimination of the imbalance vibrations are achieved at all operating speeds, and moreover robust stability is also achieved

Keywords:

INSPEC: CONTROLLED INDEXING discrete time systems electric machines magnetic bearings mechanical stability state-space methods vibration control INSPEC: NON CONTROLLED INDEXING Q-parametrization controllers discrete-time systems gain-scheduled control imbalance vibrations magnetic bearing mathematical model rotating machines rotational speed stability state space vibration control

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Control Applications, 1999. Proceedings of the 1999 IEEE International Conference on , 1 , 737 - 742

(2)

Design of Robust Load Frequency Controller For a Hydrothermal Power System Using Q-parametrization Theory

Ahmed Nabil A. Mohamed, Mohamed M. M. Hasan, and Abdelfatah M. Mohamed

Abstract:

NULL

Keywords:

NULL

Published In:

Journal of Engineering Sciences , Vol. 31, No. 3 , pp.643-660

(3)

Model Predictive Control of a Wind Turbine Based on Linear Parameter-Varying Models

Abdelrahman Morsi Hossam S. Abbas Abdelfatah M. Mohamed

Abstract:

NULL

Keywords:

NULL

Published In:

2015 IEEE Conference on Control Applications (CCA) Part of 2015 IEEE Multi-Conference on Systems and Control , NULL , NULL

(4)

CONTROL OF A WIND TURBINE USING MODEL-BASED PREDICTIVE CONTROL

Abdelrahman Morsi Hossam S. Abbas Abdelfatah M. Mohamed

Abstract:

This paper presents as application of discrete-time model predictive control (MPC) to control a utility scale wind turbine based on linearized models. The main objective of the controller is to allow the wind turbine to extract from the wind a prespecified desired amount of power according to the wind speed during the whole range of operation. A nonlinear model of a 225 kW wind turbine is considered; at each sampling instant, a linearized model of the corresponding operating point is computed and used to obtain the optimal control input by solving an infinite horizon MPC problem. The procedure is repeated in the subsequent samples to control the nonlinear model. This MPC scheme can guarantee the stability of the closed-loop system at the operating point and its neaighborhood and it demonstrates high control performance.

Keywords:

NULL

Published In:

The International Conference of Engineering Sciences and Applications , NULL , 262-267

(5)

Wind turbine control based on a modified model predictive control scheme for linear parameter-varying systems

Abdelrahman Morsi , Hossam S. Abbas, Abdelfatah M. Mohamed

Abstract:

This study presents a successful application of a model predictive control (MPC) design approach based on linear parameter-varying (LPV) models subject to input/output constraints to control a utility-scale wind turbine. The control objectives are to allow the wind turbine to extract from the wind the rated power taking into account the wind speed variation, to reduce mechanical loads and power fluctuations and to guarantee the stability of the system for the whole range of operation. A modified min□max MPC-LPV scheme is proposed to compute online the optimal control input at each sampling instant by solving an optimisation problem subject to linear matrix inequality constraints. To reduce the conservatism of the original MPC scheme due to the overbounding associated with affine parameter-dependence, the full block S-procedure with a linear fractional transformation formulation is used. The performance and the efficiency of the proposed MPC-LPV algorithm is validated via simulation and compared with the original scheme and other conventional controllers.

Keywords:

NULL

Published In:

IET Control Theory & Applications , vol. 11, No. 17 , 3056-3068

(6)

Model Predictive Control of a Wind Turbine Based on Linear Parameter-Varying Models

Abdelrahman Morsi, Hossam S. Abbas, Abdelfatah M. Mohamed

Abstract:

This paper demonstrates the application of a low conservative model predictive control (MPC) scheme based on linear parameter-varying (LPV) models to control a utility scale wind turbine. The main objective of the controller is to allow the wind turbine to extract from the wind a prespecified desired amount of power according to the wind speed and to guarantee the stability of the closed-loop system during the whole range of operation. An LPV representation for a nonlinear model of a 225 KW wind turbine is developed using the Jacobian linearization based technique. A tight parameter set is considered to reduce the conservatism of the LPV model. Then a quasi min-max MPC-LPV algorithm is used to compute online the optimal control input at each sampling instant. The performance and the efficiency of the MPCLPV scheme is validated via simulation and it is compared with another MPC scheme based on linearized models of the system.

Keywords:

NULL

Published In:

2015 IEEE Conference on Control Applications (CCA) Part of 2015 IEEE Multi-Conference on Systems and Control , NULL , 318-323

(7)

New 3D translational interconnected manipulator for industrial applications

Sameh, Ahmed; Fanni, Mohamed; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

Proceedings of 2018 IEEE International Conference on Mechatronics and Automation, ICMA 2018 , NULL , p 469-474

(8)

Dynamic modeling and robust motion control of a 2D compliant pantograph for micromanipulation

Elgammal, Abdullah T.; Fanni, Mohamed; Lashin, Manar; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

Proceedings - 2016 the 2nd International Conference on Control, Automation and Robotics, ICCAR 2016 , NULL , p 159-164

(9)

PD type of fuzzy controller for a new 3DOF fully decoupled translational manipulator

Lashin, Manar; Fanni, Mohamed; Magdy, Mahmuod; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

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Published In:

Proceedings - 2016 the 2nd International Conference on Control, Automation and Robotics, ICCAR 2016 , NULL , p 263-267

New fully decoupled manipulator with three translational motion for pick and place applications

Magdy, Mahmoud; Fanni, Mohamed; Elgammal, Abdullah T.; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

Proceedings - 2016 the 2nd International Conference on Control, Automation and Robotics, ICCAR 2016 , NULL , p 258-262

(11)

Design of a novel hybrid exoskeleton for mass handling

Sayed, B.M.; Fanni, Mohamed; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

Proceedings of 2016 Asia-Pacific Conference on Intelligent Robot Systems, ACIRS 2016 , NULL , p 118-123

(12)

Dynamic Modeling and Inverse Optimal PID with Feed-forward Control in H□Framework for a Novel 3D Pantograph Manipulator

Lashin, Manar; Fanni, Mohamed; Mohamed, Abdelfatah M.; Miyashita, Tomoyuki

Abstract:

NULL

Keywords:

NULL

Published In:

International Journal of Control, Automation and Systems , v 16, n 1 , p 39-54

(13)

Macro/micro-positioning control and stability analysis of contactless active robotic joint using active magnetic bearing

Selmy, Mohamed; Fanni, Mohamed; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

2017 IEEE International Conference on Autonomous Robot Systems and Competitions, ICARSC 2017 , NULL , June 29, 2017

(14)

Cyclic gait planning and control of underactuated five-link biped robot during single support and impact phases for normal walking

Seleem, Ibrahim A.; Assal, Samy F. M.; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

Proceedings of the IEEE International Conference on Industrial Technology , v 2018-February , p 123-128

A novel propeller-type climbing robot for vessels inspection

Alkalla, Mohamed G.; Fanni, Mohamed A.; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

IEEE/ASME International Conference on Advanced Intelligent Mechatronics, AIM , v 2015-August , p 1623-1628

(16)

A hybrid ECG compression technique based on DWT and removal of interbeats and intrabeats correlations

Abo-Zahhad, M.M.; Mohamed, Abdelfatah M.; Hussein, Aziza I.

Abstract:

NULL

Keywords:

NULL

Published In:

Proceedings - 2015 10th International Conference on Computer Engineering and Systems, ICCES 2015 , NULL , p 416-421

(17)
Design of a Novel All Terrains Wearable Vehicle

Sayed, B.M.; Fanni, Mohamed; Mohamed, Abdelfatah M.

Abstract:

NULL

Keywords:

NULL

Published In:

Proceedings - 2016 3rd International Conference on Information Science and Control Engineering, ICISCE 2016 , NULL , p 923-928

(18)

Experimental validation of a motion generation model for natural robotics-based sit to stand assistance and rehabilitation

Asker, Ahmed; Assal, Samy F.M.; Ding, Ming; Takamatsu, Jun; Ogasawara, Tsukasa; Mohamed, A.M.

Abstract:

NULL

Keywords:

NULL

Published In:

2016 IEEE International Conference on Robotics and Biomimetics, ROBIO 2016 , NULL , p 214-219