



Modelling and Development of a Magnetic Levitation System

By Athel Redah

AV Akademiker Verlag Apr 2015, 2015. Taschenbuch. Book Condition: Neu. 220x150x8 mm. This item is printed on demand - Print on Demand Neuware - Magnetic levitation technology has evolved as an important consideration in designing and developing systems with frictionless guidance and suspension. The main objective undertaken in this thesis is to create a model and develop a magnetic levitation system capable of levitating and moving a ferromagnetic object by means of a real-time controlled magnetic field generated by a set of electromagnets. An analytical mathematical model describing the electromechanical dynamics of the system is obtained and identified. In addition, a simplified and more efficient mathematical model based on experimental data is investigated. Three different vertical direction controllers based on different nonlinear control theories: Jacobian Linearization, Feedback Linearization and Sliding Mode Control, are proposed and validated. The mechanical components of a three-dimensional magnetic levitation system with simple position control scheme are designed and analyzed. A concept of digital control system consist of microcontroller based digital controller, position sensor system and digitally controlled power drivers is developed and implemented to track a reference position signal. Finally, the procedure of integrating the designed system into a suggested avionics system concept to estimate the...



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