

The thesis was titled: "Application of the Multi-Layer Observer for a Two-Mass Drive System." The thesis presents the idea of the multi-layer observer and its application to the control of a two-mass drive system. Chapter one contains a literature review and describes the rationale for choosing the dissertation topic, its purpose, scope and the main thesis. Chapter two describes the mathematical model of the object under study - a drive system with an flexible connection, then chapter three presents selected control structures for an object of this type. In addition to basic control systems using a PI controller, advanced structures such as a state controller, a controller with disturbance compensation and a predictive controller are included. The fourth chapter describes selected estimation structures used in two-mass drive systems. Algorithmic methods such as the Luenberger observer and the Kalman filter are presented. Chapter five presents the idea of a multilayer observer and a series of simulation studies demonstrating its operation, potential applications and the issue of robustness to changing object parameters. The sixth chapter begins with a description of the test rig used to conduct the experimental studies and presents specific examples of the application of the multilayer observer operating in various control structures. Simulation studies have been supported by experimental studies; in each study, the result obtained by a system with a multilayer observer is compared to the result obtained by a system with a classical version of the estimator. The following ideas are presented: a multilayer observer with a dynamic variable that reduces the noise level of signals, a control system that is resistant to the unknown initial state of the control object, a safe control system that limits the torsional torque present in the system, an adaptive control system for an object with an unknown value of the load parameter. The seventh chapter contains a summary and key conclusions and the eighth chapter contains a list of the literature used.

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