

ADAPTIVE AND ROBUST CONTROL

Course Workload		Assessment form (examination/ graded test/ ungraded test)
ECTS	Hours	
6	216	Exam

The aim of this discipline is to explain the methods of adaptive and robust control design based on the Lyapunov functions and, as a result, to develop research skills in the area of control of technical systems. The discipline goes over the fundamental algorithms of adaptive and robust control of scalar and multidimensional plants, with the state vector being either measurable and immeasurable. Attention is paid to the plant's parameterization used for parameters identification, adaptive state observers design and model reference adaptive control as well.

Course structure:

1. ADAPTIVE STATE CONTROL FOR LINEAR PLANTS

- 1.1. Lyapunov Function Method.
- 1.2. Adaptive Control for Scalar Plants.
- 1.3. Adaptive Control for Multidimensional Plants.

2. ROBUST STATE CONTROL FOR LINEAR PLANTS

- 2.1. Control for Disturbed Systems. Robustness.
- 2.2. Robust Control for Scalar Plants.
- 2.3. Robust Control for Multidimensional Plants.

3. STANDARD ERROR MODELS

- 3.1. Static Error Model.
- 3.2. Dynamic Error Model with Measurable State.
- 3.3. Dynamic Error Model with Measurable Output.

4. PARAMETRIZATION OF LINEAR PLANT MODEL

- 4.1. Methods of plant output parametrization.
- 4.2. Methods of plant state parametrization.
- 4.3. Synthesis of Adaptive Observer.

5. ADAPTIVE OUTPUT CONTROL FOR LINEAR PLANTS

- 5.1. Direct Adaptive Output Control.
- 5.2. Augmented Error Approach.

6. ADAPTIVE COMPENSATION OF UNKNOWN MULTI-HARMONIC DISTURBANCES

6.1. Observer for Disturbance Model Exosystem State.

6.2. Adaptive Compensation of External Disturbances.

7. ADAPTIVE TRACKING OF UNKNOWN MULTI-HARMONIC REFERENCE SIGNAL

7.1. External Signal Parametrization.

7.2. Model Reference Adaptive Control.