<table>
<tr><td colspan="5">NONLINEAR MODEL PREDICTIVE CONTROL – THEORY and APPLICATIONS</td><td>AR-318</td></tr>
<tr><td colspan="2">Rota
annually WS</td><td>Duration
1 Semester</td><td>Semester
3rd (Semester)</td><td>SWS
5 SWS</td><td>Credit Points
10</td><td>Workload
300 h</td></tr>
<tr><td>1</td><td colspan="6">Modul Structure</td></tr>
<tr><td></td><td colspan="2">Course (Abbreviation)</td><td>Type/ SWS</td><td>Presence</td><td>Self Study</td><td>Credit Points</td></tr>
<tr><td></td><td colspan="2">a) Nonlinear Model Predictive Control – Theory and Applications</td><td>Lecture/ 3 SWS</td><td>35 h</td><td>40 h</td><td></td></tr>
<tr><td></td><td colspan="2">b) Nonlinear Model Predictive Control – Theory and Applications</td><td>Tutorial/ 1 SWS</td><td>15 h</td><td>40 h</td><td></td></tr>
<tr><td></td><td colspan="2">c) Nonlinear Model Predictive Control – Theory and Applications</td><td>Practical training / 1 SWS</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td colspan="6">Language
English</td></tr>
<tr><td>3</td><td colspan="6">Content
Elemente1
Basics of optimal control theory and numerical optimal control
• Optimality condtions for static problems
• Formulation of optimal control problems
• Gateaux derivative
• Pontryagin Maximum Principle
• Indirect and direct solution methodsffiiziente derivative computation
Advanced aspects of optimal control
• Existence of optimal solutions
• Dual variables
• Singular problems
• Dissipativity and turnpike properties
Modell predictive control of sampled-data systems
• Basics of MPC
• Sufficient stability conditions with and without terminal constraints
• Economic cost functions
• Differences of continuous time and discrete time formulations
• Design and implementation aspects
Outlook
• Stochastic and robust MPC
• Limits of MPC
Case studies
• Energy efficiency in technical systems, multi-energy systems, and others
Lehrinhalte Elemente 2 und 3
• Black board and programming sessions (ca 20h at home and ca 10h in course)

Literature:</td></tr>
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