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## Vortragsankündigung

Seminar Regelungssysteme LV 0430L654

Donnerstag, 23. April 2015, 15:00 Uhr  
Vortragsort: EN 223

**Prof. Florian Dörfler**  
ETH Zürich, Switzerland

“Decentralized and optimal control of inter-area oscillations in power networks”

Local and inter-area oscillations in bulk power systems are typically identified using spatial profiles of poorly damped modes, and they are mitigated via carefully tuned decentralized controllers. Recent research efforts have been aimed at developing wide-area control strategies that involve communication of remote signals. In conventional wide-area control, the control structure is fixed a priori typically based on modal criteria, and structured controllers are tuned accordingly. In this seminar, we employ non-modal tools to analyze and control inter-area oscillations. Our input-output analysis examines power spectral density and variance amplification of stochastically forced systems and offers new insights relative to modal approaches. To improve upon the limitations of conventional wide-area control strategies, we also study the problem of signal selection and optimal design of sparse and block-sparse wide-area controllers using the recently-introduced paradigm of sparsity-promoting optimal control. In our design, we preserve rotational symmetry of the power system by allowing only relative angle measurements in the distributed controllers. We use the New England and New York power grid models to examine performance tradeoffs and robustness of different control architectures. We demonstrate that optimal and fully-decentralized control strategies can effectively guard against local and inter-area oscillations.