



University of Pavia

Ph.D. School of Electrical and Electronics Engineering and Computer Science

SEMINAR

A passivity and consensus based approach to optimal frequency regulation in electricity networks

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Abstract: The increasing amount of volatile and uncontrollable renewable energy sources require new solutions to guarantee the proper functioning of an electricity network. During this talk I will focus on frequency regulation and I will emphasize that many networks (e.g. high voltage networks or microgrids) possess an incremental passivity property that is useful to design distributed controllers. A communication network allowing the exchange of information among the controllers ensures that at steady state an overall cost function is minimized and as such relates constrained optimization to the study of dynamical systems. Furthermore, I will discuss how sampled communication in closed loop with the continuous physical system can be elegantly formulated as a hybrid system. Recent developments allow the extension towards non-passive dynamics where sliding mode control offers powerful techniques to constrain the system to a manifold where the passivity property is recovered.

Bio: Sebastian Trip was born in Stadskanaal, the Netherlands. He obtained his BSc and MSc degree in Physics and 'Energy and Environmental Sciences' respectively. Since then he is applying techniques from control theory and machine learning to the design of smart grids. Currently he is working within the Danish research project 'Efficient Distribution of Green Energy' (EDGE), in collaboration with multiple international companies and research institutes. His main interests include distributed control, renewable energy and optimization. He has published in leading journals on control theory and has presented his work at various IEEE conferences.

Organizer

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Seminar in English

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