

# Adaptive control of cluster synchronization in delay-coupled oscillators

Philipp Hövel<sup>1</sup>

<sup>1</sup>*Technische Universität Berlin, Germany (e-mail: phoewel@physik.tu-berlin.de)*

Adaptive networks are characterized by mutual interactions between the dynamics of the nodes on one hand and a co-evolution of the coupling topology on the other hand: The topology evolves according to the state of the system, while at the same time the dynamics on the network is influenced by that changing topology.

In my presentation, I will discuss an adaptive control scheme for the control of in-phase and cluster synchronization in delay-coupled networks of Stuart-Landau oscillators. This paradigmatic normal form arises naturally in an expansion of systems close to a Hopf bifurcation. Based on an automated control scheme called speed-gradient method, the topology of a network adjusts itself in a self-organized manner such that the target state is realized. I will provide numerical evidence that the networked system settles into different cluster states depending on a pre-defined control function.

- [1] Lehnert J., Hövel P., Selivanov A. A., Fradkov A. L., Schöll E., Controlling cluster synchronization by adapting the topology, *Physical Review E* **90**:042914, 2014.