

Einladung zum Würzburger Mathematischen Kolloquium

Julius-Maximilians-Universität Würzburg • Fakultät für Mathematik und Informatik

Marc Timme

Chair for Network Dynamics, TU Dresden

Computing via Networks of States – From Unstable Attractors to Heteroclinic Dynamics

Mittwoch, 22. November 2017 • 16:15 Uhr

Raum SE 40, Mathematik Ost, Emil-Fischer-Str. 40, Campus Hubland-Nord

Inhaltsangabe:

Network dynamical systems are commonly considered to consist of natural or artificial units (represented by the vertices of a graph) that dynamically interact via direct physical connections (the edges of a graph). To explore capabilities of bio-inspired computing by coupled dynamical systems, we here propose a complementary perspective and consider abstract networks in the state space of the system. The vertices are saddle states (indeed, unstable attractors – periodic orbits that are attractors in the sense of Milnor yet locally unstable) and high-dimensional external input signals guide the trajectory of the system close to heteroclinic connections, invariant sets that connect saddles. The repeated passing of saddles can be interpreted as the completion of a computational task. We show that a broad range of heteroclinic networks enables universal forms of computation, including binary, ternary and n-ary computation in parallel and in a robust, self-correcting way. The number of computable items scales almost exponentially with system size. The results suggest that systems of coupled oscillators may offer the backbone for robust, bio-inspired, scalable computation via networks of states. I discuss mathematical and practical challenges for future research.



www.mathematik.uni-wuerzburg.de/kolloquium.html

Zu diesem Vortrag laden wir Sie herzlich ein.
Im Anschluss an den Vortrag stehen Kaffee und Tee im Foyer vor dem SE 40 bereit.

