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Time-Varying Dynamical System Networks in the Light of Hybrid Symmetry

S. Hage-Packhäuser and M. Dellnitz
Chair of Applied Mathematics, University of Paderborn, Germany

Numerous dynamical systems describing real world phenomena exhibit a characteristic fine structure which stems from the interaction of many dynamic instances. Furthermore, since reality crucially depends on time, such dynamical system networks - more concisely termed coupled cell systems - are generally subject to temporal changes. Particularly in applications involving nature and technology, this temporal evolution of the system itself often occurs as a consequence of instantaneously time-varying network structures. In turn, this network switching may give rise to very regularly shaped dynamics.
In this work, time-varying networks of dynamical systems are discussed in terms of hybrid dynamical systems with a special consideration of symmetries which are naturally due to the network structures involved. By means of the recent notion of hybrid symmetries, a hybrid symmetry framework is presented and symmetry-induced switching strategies are investigated. In the face of applications, this type of self-organized switching can be interpreted as cyclically moving network perturbations and it is shown to be relevant in connection with stabilization issues of switched systems.