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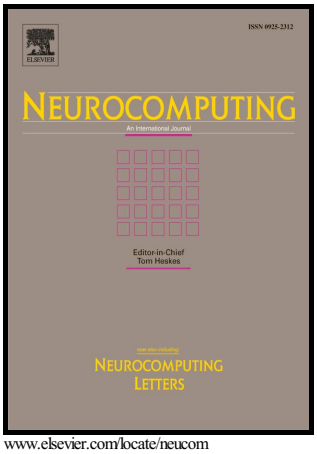

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Generalized Multi-Synchronization: A Leader-following Consensus Problem of Multi-Agent Systems

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Abstract

In this paper, the problem of Generalized Multi-Synchronization (GMS) in master-slave topology is addressed. Within a differential algebraic framework this problem is interpreted as a leader-following consensus problem of Multi-Agent Systems (MAS). Here, a multi-agent system is treated as a network of interconnected systems with strictly different dynamics of same dimension, fixed and not strongly connected topology. Multi-agent system is carried out to a Multi-output Generalized observability Canonical Form (MGOCF) with a family of transformations obtained from an adequate selection of the differential primitive element as a linear combination of state measurements and control inputs. This allow us to explicitly give the synchronization algebraic manifold and design a dynamic consensus protocol able to asymptotically achieve consensus for all agents in the network. Finally a worked out example is provided to illustrate the methodology proposed.

Keywords: Multi-Agent Systems, Chaotic systems, Generalized Multi-Synchronization, Multi-output Generalized Observability Canonical Form, Differential primitive element, Dynamical Controllers.

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