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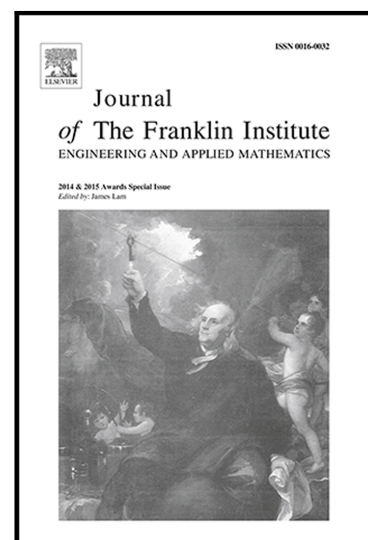
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Sampled-data based consensus for multiple harmonic oscillators with directed switching topology

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Abstract

This paper investigates the distributed consensus problem for a group of harmonic oscillators **under** directed switching topology. First, under the assumption that the union of the directed interaction graphs **has** a spanning tree, a class of sampled-data based consensus protocols are designed by using motion planning approaches and Pontryagin's principle. **The proposed protocols only require** that the union of communication topologies switched at the **sampled** instants has a spanning tree, without requiring information exchanges over the sampled interval and the connectivity of communication topology at each sampling instant. Then, **the distributed consensus problem can be solved under directed switching topology by using stability principle and the properties of stochastic matrixes**. Compared with the existing sampled-data based consensus algorithms, in this article, a remarkable advantage is that, for the proposed sampled-data based protocols, the **sampled** periods, communication topologies and control gains are decoupling and can be separately designed, which relaxes many restrictions in controller designs. Finally, as an extension of the leaderless consensus protocols, a leader-following consensus algorithm is further proposed in this paper. Some numerical examples are also given to illustrate the effectiveness of the analytical results.

Key words: Distributed Consensus; Sampled Data; Directed Switching Topology; Motion Planning; Harmonic Oscillator

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