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A Consensus Recovery Approach to Nonlinear Multi-Agent System under Node Failure

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Abstract

In large-scale networks, node failure is unavoidable and it generally brings undesirable effects on the stability and performance of the systems. Then a natural question arises: **is it possible to cope with the problem arising from the node failure in the networks, while retaining the corresponding network property (or make the network systems robust against the node failure)?** In this paper, a consensus recovery approach will be proposed to investigate the consensus of general directed nonlinear multi-agent networks with node failure. The objective of the consensus recovery method is to compensate for the undesirable effects of the failure nodes, and to retain the consensus property. Numerical examples are provided to demonstrate the effectiveness of the theoretical results obtained, even for large-scale multi-agent systems.

Keywords: Multi-agent networks, Network reduction approach, Consensus recovery approach, Node failure

1. Introduction

Recently, multi-agent networks, such as distributed robots and mobile sensor networks, have been widely studied due to their broad applications ([5, 6, 24]).

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