Directed Hypergraph-based Models for the Fault Monitoring of Chemical Reaction Kinetics

Volume 166
Number 12

Year of Publication: 2017

Authors:
H. Ajemni, R. El Harabi, M. N. Abdelkrim

10.5120/ijca2017914040

Abstract

The paper deals with the use of directed hypergraph so as to model chemical reaction kinetics. Firstly, the model is directly deduced both from using systematic generation from chemical equation laws, then, based on the Bond Graph-Hypergraph analog given in details. Secondly, the causal and structural properties of a directed hypergraph are involved to design the Fault Detection and Isolation (FDI) algorithm scheme by generating redundancy relations through covering causal hyperpaths. The integrated framework is demonstrated to be effective through a tutorial example of via a reaction with a second order.

References

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Index Terms

Computer Science          Applied Sciences

Keywords

Directed hypergraph, chemical reaction kinetics, structural analysis, fault monitoring