

A Novel Instuitionistic Fuzzy P-Graph for Optimal Synthesis of Cogeneration System

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Abstract

The aim of this study is that develops a novel intuitionistic fuzzy p-graph for optimal synthesis of cogeneration system. The tradition P-graph model allows mathematically rigorous model-building and efficient identification of optimal (and near optimal) solutions to Process Network Synthesis (PNS) problems. The P-graph model has been confirmed to be very profitable; its relevance surrounds wide variety of fields as reaction-pathway identification, vehicle-routing problems and business-process modeling. Moreover, the fuzzy p-graph is developed to handle non-deterministic scenarios by using fuzzy membership function. In this study, the objective and constraint of p-graph are described by intuitionistic fuzzy membership function which includes membership, non-membership, and hesitation degrees, and apply to cogeneration system. Cogeneration through combined heat and power is the simultaneous production of electricity with the recovery and utilisation heat. The cogeneration system could effectively reduce the cost of generating and purchasing electricity. Furthermore, the cogeneration system of steam and electricity can also improve the reliability of power supply, promote the integration of regional energy resources, reduce the loss of power shortage and promote energy saving and carbon reduction. In this study, the intuitionistic fuzzy p-graph approach is successfully developed for the optimal synthesis of cogeneration system that meet the specified intuitionistic fuzzy objective and constraints. The results of intuitionistic fuzzy p-graph could display different feasible solutions with tuning the hesitation degrees.

Keywords: Fuzzy p-graph, intuitionistic fuzzy membership function, cogeneration system, carbon reduction