An Industrial Area Layout Optimization Method Based on Dow's Fire & Explosion Index Method

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Abstract

In the process of plant and industrial area layout design, safety issue is very important and cannot be ignored. Dow’s Fire & Explosion Index (F&EI) Method is an accurate and widely used approach to evaluate plant safety. Researches using Dow’s method on layout problem is mature in plant level, but very few works are focus on the industrial area level. This paper determines the layout of industrial area based on the safety evaluation of plant resulting from Dow’s method. In this work, the risk of industrial area is determined through F&EI of each plant evaluated from Dow’s method. An objective function is established to consider the risk of the industrial area, the risk of each plant, the distance between plants and the purchase cost of each plant. In addition, we consider the problem as a discrete layout problem, and it is solved by genetic algorithm. By optimizing the problem, safer industrial area layout can be obtained. This new layout design method consider safety evaluation from the view of whole industrial area. Because Dow’s method was established on the basic of a great deal of engineering practices, the method we proposed can be more practical compared with others. The case study is used to illustrate the feasibility and effectiveness of the industrial area layout method we proposed.