



AN IMPROVED MULTI-OBJECTIVE EVOLUTIONARY OPTIMIZATION ALGORITHM FOR SUGAR CANE CRYSTALLIZATION

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Abstract- The nature of optimization for intermittent sugar cane crystallization process is to obtain ideal crystals. One typical difficulty in crystallization optimization refers to the simultaneous effects of both seeding characters and process variables on the final crystal size distribution (CSD) parameters, including mean size (MA) and coefficient of variation (CV). And the application of traditional multi-objective evolutionary algorithm in crystallization process could not optimize all of them. Therefore, this paper puts forward a different multi-objective framework, and correspondingly, an improved optimization algorithm is applied to intermittent sugar cane crystallization. This method combines the elitist non-dominated sorting genetic algorithm (NSGA-II) with technique for order preference which is similar to an ideal solution (TOPSIS), and it provides a quantitative way to analyze the effect of both seed characteristics and process variables on the trade-off between MA and CV. Furthermore, the proposed algorithm has been adapted here to be compared with the NSGA-II, and the comparing results demonstrate better Pareto-optimal solutions of the novel approach.

Index terms: Multi-objective optimization, Intermittent sugar cane crystallization, NSGA-II, TOPSIS.