Genetic Algorithm for Optimizing of Thermal Performance of an Air Cooler Equipped with Jagged Inserts

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Abstract

This paper presents an application of genetic algorithms (GA) to the problem of optimizing the thermal performance of an air cooled heat exchanger equipped with the jagged twisted tape inserts. This method is one of the evolutionary algorithms which is based on natural selection and natural genetics and used in optimization of varies engineering fields such as industrial planning, Pattern recognition, Resource allocation and so on. Simplicity and accuracy are some of the advantages of this method. Experiments included the twist ratio ranging from 1.76 to 3.53. Also, the Reynolds number varied from 4021 to 16118. After data reduction, the regression equation of thermal performance was obtained as a function of Reynolds number and the twist ratio. Then the fitness function was optimized by the use of GA. One can be sure that the thermal performance will be optimized through the optimization of the fitness function. Optimization results show that the proposed optimization algorithm is quite effective and powerful in optimizing the fitness function. According to the results, in order to obtain maximum thermal performance, the twist ratio must be at the lowest level. This means that, by increasing the twist ratio of jagged inserts, the thermal performance of inserts decreases.

Keywords: Air cooled heat exchanger, Thermal performance, Jagged twisted tape inserts, Optimization, Genetic algorithm (GA).

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