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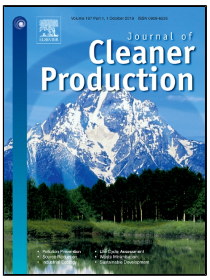

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Optimization of Circulating Cooling Water Networks Considering the Constraint of Return Water Temperature

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ABSTRACT: Circulating cooling water system is widely used in industry. Traditionally, circulating cooling water system is in a parallel structure. Without reuse of cooling water, the return temperature of water is low and total flow rate of water is high. This leads to the low efficiency of cooling tower and high energy consumption of system. When the coolers are in series arrangement and water is reused, the return temperature of cooling water will increase. High return temperature of cooling water can lead to the severe fouling of coolers. The level of fouling depends on outlet temperature and velocity of water. In this paper, we proposed model where cooling water is reused and the fouling of cooler is avoided. The numerical relationship between stream velocity and return temperature is introduced. The objective is to formulate the framework with minimum flow rate and no fouling with coolers. A case study is used to show the effectiveness of the proposed model.

Keywords: Circulating cooling water, optimization, return temperature, flow rate, fouling

1. Introduction

Given the great thermal property and non-harmful chemical composition of water, cooling water systems are widely used to dissipate low-grade heat of chemical and petrochemical process industries, electric-power generation stations, refrigeration, and air conditioning plants (Serna-