New Enhanced Cooling Towers Models by Implementation of Drift Losses Calculations

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Abstract

Currently, the most commonly used model to simulate cooling tower operation is Merkel's model, though its implementation involves various hypotheses proving sometimes to be not suitable for real applications. Research demonstrates that it is possible to substitute this model by a more simplified one introduced by Arns and Klenke. Although this substitution has given satisfactory results for both models, it is found that the water loss (also called the drift losses) is neglected. This work tends to improve Merkel and Simplified models by implementing the calculation of water losses by drift as well as contributing to enrich the simplified model so as to substitute Merkel's model. This paper describes the new formulations of the standard and simplified models introducing the drift losses calculation. This latter represents water mass flow rate escaping from the cooling system in the form of droplets and mechanically driven in the outlet air flow. The authors have conducted a comparative study of the results obtained with these improved models. This study shows very good agreement between the two models which allows the substitution of Merkel's model by Simplified model and they offer a better simulation for the operation of counter flow cooling towers.

Keywords

Cooling Tower; Modelization; Simulation; Evaporation; Drift Losses; Heat Exchanger

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