Experimental investigation on heat transfer in horizontal-tube falling-film evaporator

Shengqiang Shen*, Xingsen Mu, Yong Yang, Gangtao Liang, Xiaohua Liu

Key Laboratory for Desalination of Liaoning Province, Dalian University of Technology, Dalian 116024, Liaoning, China,
Tel. +86 411 84708464; Fax: +86 411 84707963; emails: zzbshen@dlut.edu.cn, magicruby@gmail.com (S. Shen)

Received 7 August 2013; Accepted 23 July 2014

ABSTRACT

An experimental platform for horizontal-tube falling-film evaporation was set up to measure heat transfer characteristics. Experiments were carried out to show how the heat transfer coefficient (HTC) was affected by different parameters including spray Reynolds number (Re), saturation temperature, salinity, and tube arrangement. The results revealed that the HTC increased first and then decreased with growth of Re, and the HTC of seawater decreased with increasing saturation temperature. The results also showed that the HTC of rotated square pitch was higher than triangular pitch, rotated triangular pitch, and square pitch, but the heat transfer capacity per unit volume of triangular pitch was the highest. Meanwhile, the HTC decreased during the increase of salinity.

Keywords: Desalination; Horizontal-tube falling-film evaporator; Tube arrangement; Salinity

*Corresponding author.

1944-3994/1944-3986 © 2014 Balaban Desalination Publications. All rights reserved.