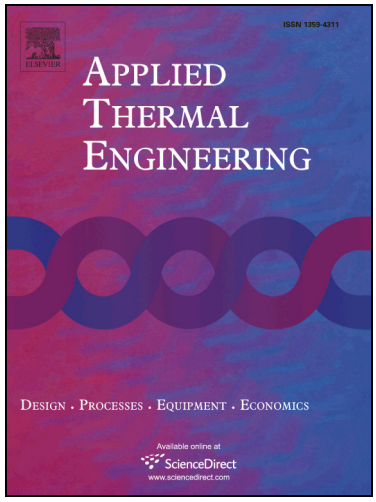

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Ali Sohani, Hoseyn Sayyaadi, Hamidreza Hasani Balyani, Sina Hoseinpoori

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A Novel Approach Using Predictive Models for Performance Analysis of Desiccant Enhanced Evaporative Cooling Systems

Ali Sohani, Hoseyn Sayyaadi[*1], Hamidreza Hasani Balyani, Sina Hoseinpoori

Faculty of Mechanical Engineering-Energy Division, K.N. Toosi University of Technology, P.O. Box: 19395-1999, No, 15-19, Pardis St., Mollasadra Ave., Vanak Sq., Tehran 1999 143344, Iran

Abstract

A thorough investigation on parameters that having the potential impact on performance of the desiccant enhanced evaporative air conditioning, DEVAP, system was conducted. Five soft computing and statistical tools, SCST, including the artificial neural network, ANN, group method of data handling, GMDH, genetic programming, GP, multiple linear regression, MLR, and stepwise regression method, SRM, were used to predict the overall performances of DEVAP system. These SCST models were trained and tested using numerical and experimental data. The dehumidifier stage was assumed to be incorporated separately into two different types of counter flow indirect dew point evaporative coolers as the second stage. For each stage, the best SCST models have been determined through comparing with experimental data via error criteria, including the mean square error (MSE), and coefficient of determination (R^2). It was found that the GMDH and SRM methods propose the foremost models for evaluating the performance of the second stage. Furthermore, SRM approach was found to be the best model describing the performance of the dehumidifier. Then a comprehensive sensitivity analysis was conducted for dehumidifier part. It was concluded that an effective strategy for improving dehumidifier is the implementing a part of its product air as the working air.

Keywords: *Analytical expression; dehumidifier; desiccant enhanced evaporative cooling systems; DEVAP; M-cycle indirect evaporative cooler; soft computing and statistical methods*

Nomenclature

vol	volume (L)	

*Corresponding author
Email: sayyaadi@kntu.ac.ir , hoseynsayyaadi@gmail.com, Tel: +98-21-8406-3212, Fax:+98-21-8867-4748