

Accepted Manuscript

Research Paper

Design and retrofit optimization of the cellulose evaporative cooling pad systems at diverse climatic conditions

Ali Sohani, Hoseyn Sayyaadi

PII: S1359-4311(16)34145-X

DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2017.05.120>

Reference: ATE 10433

To appear in: *Applied Thermal Engineering*

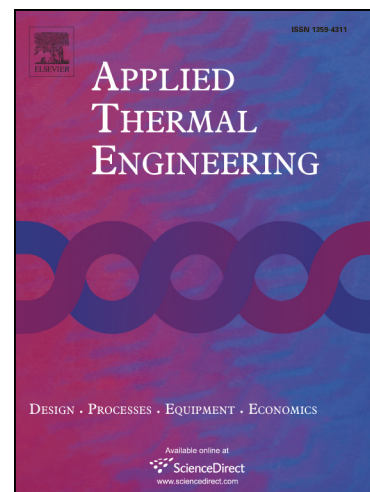
Received Date: 15 December 2016

Revised Date: 20 May 2017

Accepted Date: 22 May 2017

Please cite this article as: A. Sohani, H. Sayyaadi, Design and retrofit optimization of the cellulose evaporative cooling pad systems at diverse climatic conditions, *Applied Thermal Engineering* (2017), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2017.05.120>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Design and retrofit optimization of the cellulose evaporative cooling pad systems at diverse climatic conditions

Ali Sohani¹, Hoseyn Sayyaadi^{*1}

¹ 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

Cellulose pad direct contact evaporative coolers (CPDECs) were modeled and optimized. In this regards, a detailed method for evaluation of the initial cost was introduced. This model was employed to minimize the life-cycle cost (LCC) and the annual water consumption (AWC) and maximize the annual average coefficient of performance (AACOP). It was assumed that the CPDEC was employed as the cooling system for a middle flat of a five-story residential building with floor area of 97.1 m². Multi-objective Optimization (MOO) imposing proper constraints, including thermal comfort was done in two scenarios: design optimization process (DOP, applicable before production) and retrofit optimization process (ROP, for currently manufactured systems). From the different groups within the Koppen-Geiger climate classification system, the ones in which the CPDEC had the potential of usage were identified; a sample city from each group was selected, and the features of the optimized systems for that condition were obtained. It was found that for all applicable climates in ROP as well as classes 'B' and 'C' in DOP, the optimum specific contact area was 540 m².m⁻³. Moreover, the features of the optimized system in ROP were affected by both climatic and economic parameters while in DOP the effect of climatic condition was much more than economic criteria. The results also showed that in comparison to the base case conditions, MOOs improved, in average, LCC, AWC, and AACOP 52.8%, 74.3% and 146.9% in the case of DOP and 20.9%, 64.6% and 70.1% in the case of ROP. These mean significant improvements can be achieved by MOOs in the both scenarios.

* Corresponding author Tel: +98-21-8406-3212, Fax:+98-21-8867-4748
Email addresses: Ali Sohani (alisoahany@yahoo.com), Hoseyn Sayyaadi (sayyaadi@kntu.ac.ir, hoseynsayyaadi@gmail.com)

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات