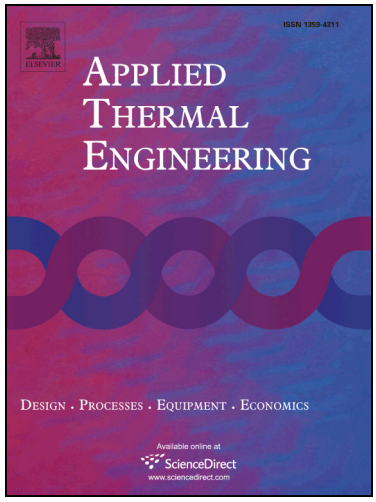

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Kuljeet Singh, Ranjan Das

PII: S1359-4311(16)33830-3
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2016.12.002
Reference: ATE 9622

To appear in: *Applied Thermal Engineering*

Received Date: 23 August 2016
Revised Date: 29 November 2016
Accepted Date: 2 December 2016

Please cite this article as: K. Singh, R. Das, An improved constrained inverse optimization method for mechanical draft cooling towers, *Applied Thermal Engineering* (2016), doi: http://dx.doi.org/10.1016/j.applthermaleng.2016.12.002

An improved constrained inverse optimization method for mechanical draft cooling towers

Kuljeet Singh, Ranjan Das*

Department of Mechanical Engineering,

Indian Institute of Technology Ropar, Punjab, 140001, India

Abstract

In this work, a constrained multiple parameter inverse identification technique is proposed for a mechanical cooling tower to meet a required heat rejection rate from hot water and also ensuring minimum power consumption. The present technique minimizes the relevant objective function involving the total tower power consumption satisfying the constraint of the required heat load in the inverse analysis. The constraint uses a continuous polynomial function obtained using the experimental data with mass flow rate of air and water as control variables. The comparison of the present constrained inverse retrieval technique is made against the traditional unconstrained inverse parameter retrieval technique satisfying the same heat load. The demonstration of the constrained and the unconstrained inverse retrieval techniques as live feedback tool controlling the tower performance is also presented. The proposed constrained inverse parameter retrieval-based feedback technique is found preferable to ensure least power consumption to meet a required tower heat load.

keywords: constrained optimization method; optimum operating parameters; power saving; ALGA; feedback and control

The ISIRD grant received from IIT Ropar, Punjab for this work is duly acknowledged.

*Corresponding author: E-mail:ranjandas81@gmail.com, Telephone: +91-1881-242245, Fax: +91-1881-223395