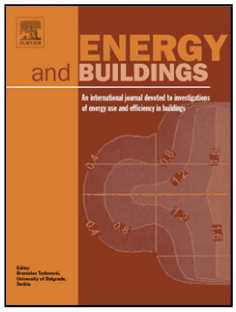

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PII: S0378-7788(16)30610-7
DOI: http://dx.doi.org/doi:10.1016/j.enbuild.2016.07.014
Reference: ENB 6845

To appear in: *ENB*

Received date: 30-11-2015
Revised date: 16-6-2016
Accepted date: 5-7-2016

Please cite this article as: Dan Li, Guoqiang Hu, Costas J. Spanos, A Data-driven Strategy for Detection and Diagnosis of Building Chiller Faults Using Linear Discriminant Analysis, *<![CDATA[Energy & Buildings]]>* (2016), http://dx.doi.org/10.1016/j.enbuild.2016.07.014

A Data-driven Strategy for Detection and Diagnosis of Building Chiller Faults Using Linear Discriminant Analysis ☆

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Abstract

Chillers contribute to a significant part of the building energy consumption. In order to save energy and improve the performance of building automation systems, there is an increasing need for chiller fault detection and diagnosis (FDD). This paper proposes a two-stage data-driven FDD strategy which formulates the chiller fault detection and diagnosis task as a multi-class classification problem. Linear Discriminant Analysis (LDA) is adopted to project high dimensional data into a lower dimensional space so as to achieve maximum class separation and original class information maintenance. At the first stage, a fault is detected and diagnosed if the monitoring data set is the closest to one of the predefined fault clusters and within the predefined Manhattan distance range of the corresponding fault. At the second stage, fault severity level is recognized by comparing the monitoring data set with the corresponding predefined severity level clusters. The fault is diagnosed as at a particular severity level if it is the closest to the corresponding severity level cluster. The proposed strategy is validated by the experimental data of ASHRAE Research Project 1043 (RP-1043). Results show that the data-driven FDD strategy using LDA can detect and diagnose

☆This research is funded by the Republic of Singapore's National Research Foundation through a grant to the Berkeley Education Alliance for Research in Singapore (BEARS) for the Singapore-Berkeley Building Efficiency and Sustainability in the Tropics (SinBerBEST) Program. BEARS has been established by the University of California, Berkeley as a center for intellectual excellence in research and education in Singapore.