

Identification And Weather Sensitivity Of Physically Based Model Of Residential Air-Conditioners For Direct Load Control: A Case Study

El-Ferik, S; Hussain, SA; Al-Sunni, FM

ELSEVIER SCIENCE SA, ENERGY AND BUILDINGS; pp: 997-1005; Vol: 38

King Fahd University of Petroleum & Minerals

<http://www.kfupm.edu.sa>

Summary

In most electricity systems, the residential sector is one of the main contributors to system peaks. Hot and humid summer seasons lead to a significant proportion of the supplied power being used on air-conditioning (AC). In this work, we address the identification problem of the parameters of an aggregated elemental physically based model representing a housing unit with an AC system. The identification is done to validate the model using a pilothouse equipped with an independent air-conditioner system. An online maximum likelihood based-identification algorithm is developed. The required hardware and system instrumentation are detailed. A sensitivity analysis study of the model for variations in humidity and solar radiation is also reported. The results indicate that the physically based model succeeded to capture the effects of the outdoor conditions. (c) 2005 Elsevier B.V. All rights reserved.

References:

1. BARGIOTAS D, 1998, IEEE T POWER DELIVER, V3, P2119
2. BELHAJ CA, 2003, 7 IASTED INT C POW E, P77
3. ELFERIK S, 1994, IEEE T AUTOMATIC CON, V39, P1184
4. ELFERIK S, 2004, 13 IASTED INT C APPL
5. GEOFFREY K, 2003, ENERGY, V28, P1671
6. HART M, 2004, ENER G BUILDINGS, V36, P161, DOI
7. 10.1016/j.enbuild.2003.10.009
8. HUSSAIN SA, 2004, THESIS KING FAHD U P
9. IHARA S, 1981, IEEE T POWER APPARAT, V100, P4142

10. KAMOUN S, 1992, AUTOMATICA, V28, P885
11. MALHAME R, 1985, IEEE T AUTOMAT CONTR, V30, P854
12. MALHAME RP, 1988, SIAM J APPL MATH, V48, P465
13. MALHAME RP, 1990, ADV APPL PROBAB, V22, P564
14. MORTENSEN RE, 1989, IEEE T POWER SYST, V5, P243
15. MORTENSEN RE, 1990, IEEE T AUTOMAT CONTR, V35, P1245

For pre-prints please write to: selferik@ccse.kfupm.edu.sa; ameen@ccse.kfupm.edu.sa;
alsunni@ccse.kfupm.edu.sa