

## Accepted Manuscript

Title: Optimal Coordination of Air Conditioning System and Personal Fans for Building Energy Efficiency Improvement

Authors: Zhanbo Xu, Shuo Liu, Guoqiang Hu, Costas J. Spanos



PII: S0378-7788(16)31936-3  
DOI: <http://dx.doi.org/doi:10.1016/j.enbuild.2017.02.051>  
Reference: ENB 7412

To appear in: *ENB*

Received date: 16-12-2016  
Revised date: 20-2-2017  
Accepted date: 21-2-2017

Please cite this article as: Zhanbo Xu, Shuo Liu, Guoqiang Hu, Costas J.Spanos, Optimal Coordination of Air Conditioning System and Personal Fans for Building Energy Efficiency Improvement, Energy and Buildings <http://dx.doi.org/10.1016/j.enbuild.2017.02.051>

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.

# Optimal Coordination of Air Conditioning System and Personal Fans for Building Energy Efficiency Improvement<sup>☆</sup>

Zhanbo Xu<sup>a</sup>, Shuo Liu<sup>a</sup>, Guoqiang Hu<sup>b</sup>, and Costas J. Spanos<sup>c</sup>

<sup>a</sup> Berkeley Education Alliance for Research in Singapore, 068898, Singapore, e-mail: {zhanbo.xu & shuo.liu}@bears-berkeley.sg

<sup>b</sup> School of Electrical and Electronic Engineering, Nanyang Technological University, 639798, Singapore, e-mail: gqhu@ntu.edu.sg

<sup>c</sup> Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, CA 94720 USA, e-mail: spanos@berkeley.edu

## Highlights

- An optimization problem of coordinating ACMV and personal fans is developed.
- A Lagrangian relaxation-based approach is proposed to solve the problem.
- Calculation of cooling effect can be separated from the optimization procedure.
- Building demand response capability can be enhanced by coordinating ACMV and fans.

---

## Abstract

Air temperature and speed play a critical role in the thermal sensation of comfort felt by occupants, especially in the tropics. It is of great practical interest to coordinate air conditioning and mechanical ventilation (ACMV) system and personal fans so as to enhance building demand response (DR) capability while minimizing energy cost in response to a specific electricity price signal and maintaining thermal comfort level. In this paper, an optimization problem of coordinating ACMV and personal fans is addressed, which captures the coupling between ACMV and fans. A Lagrangian relaxation-based

---

<sup>☆</sup> This work was supported 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.

Download English Version:

<https://daneshyari.com/en/article/4919082>

Download Persian Version:

<https://daneshyari.com/article/4919082>

[Daneshyari.com](https://daneshyari.com)