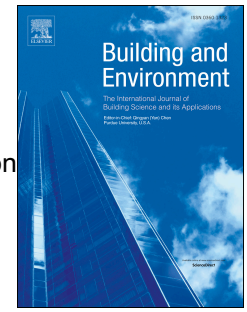
Accepted Manuscript



Numerical investigations on the effects of envelope thermal loads on energy utilization potential and thermal non-uniformity in sleeping environments

Ning Mao, Mengjie Song, Dongmei Pan, Zhao Li, Shiming Deng

PII: S0360-1323(17)30343-8

DOI: 10.1016/j.buildenv.2017.07.044

Reference: BAE 5023

To appear in: *Building and Environment*

Received Date: 3 May 2017

Revised Date: 30 June 2017

Accepted Date: 31 July 2017

Please cite this article as: Mao N, Song M, Pan D, Li Z, Deng S, Numerical investigations on the effects of envelope thermal loads on energy utilization potential and thermal non-uniformity in sleeping environments, *Building and Environment* (2017), doi: 10.1016/j.buildenv.2017.07.044.

Numerical investigations on the effects of envelope thermal loads on energy utilization potential and thermal non-uniformity in sleeping environments

Mao Ning[1], Song Mengjie[2, *], Pan Dongmei[3], Li Zhao[4], Deng Shiming[5]

[1]Department of Gas Engineering, College of Pipeline and Civil Engineering, China University of Petroleum (East China), Qingdao, China

[2] Guangdong Provincial Key Laboratory on Functional Soft Condensed Matter, Department of Energy Engineering, School of Materials and Energy, Guangdong University of Technology, Guangzhou, China

[3]School of Mechanical & Automotive Engineering, South China University of Technology, Guangzhou, China

[4]School of Environment & Architecture, University of Shanghai for Science & Technology, Shanghai, China

[5]Department of Building Services Engineering, The Hong Kong Polytechnic University, Kowloon, Hong Kong SAR, China

Abstract

Due to the variation of outdoor environment, the building envelope thermal load undergoes obviously corresponding variation. Therefore, it's previously reported that building envelope had a deep effect on the indoor thermal environment at daytime and nighttime. In subtropics, the higher energy consumption of air conditioning system makes it necessary to study the task/ambient air conditioning system, not only in commercial buildings, but also in residential buildings. At the same time, the effects of the envelope thermal load on these task/ambient air conditioning systems should also be investigated. In this study, a bedroom with a task air conditioning (TAC) system was established and the influences of the building envelope thermal load on