"I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of the degree of Bachelor Mechanical Engineering (Thermal – Fluids)"

Signature : .....

Name of Supervisor : TEE BOON TUAN

Date : 8 DECEMBER 2005

THERMAL COMFORT STUDY AND AIRFLOW SIMULATION INSIDE LECTURE ROOM

LIM CHIK MING

A thesis submitted in partial fulfillment of the requirement for the award of the degree of Bachelor of Mechanical Engineering (Thermal – Fluids)

Faculty of Mechanical Engineering
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DECEMBER, 2005

"I declared that this thesis entitled 'Thermal Comfort Study and Airflow Simulation Inside Lecture Room' is the result of my own research except as cited in reference."

Signature : .....

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Date : 8 DECEMBER 2008

Especially dedicated to Daddy, Mummy, Chik Liat, Mung Sze, Chik Long and Mei Suan.

Because of yours love, I feel so touch and wonderful … …

致给亲爱的爸爸，妈妈，志烈，梦诗，志隆与美霜。

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ABSTRACT

The main purpose of this study is to investigate relationship between thermal comfort level and air flow motion in the lecture rooms by using experimental and computer software simulation. The boundaries of this study are considered as lecture rooms with mechanical force ventilation system. The indoor air parameters addressed in this study are air velocity, air temperature and relative humidity. The human internal parameter are those of activity level with metabolic rate of 1.2 met and clothing insulation also being consider. For the thermal comfort in lecture room analysis, the ASHRAE 55-92 standard, ASHRAE seven point scales and McIntyre five point scales can be use. Air motion simulations were analyzed on the Computational Fluid Dynamics (CFD) software named CFX. The results of experiment are compared and analyzed with simulation result. SPSS software is use in this study to correlate and conducting statistical analysis on the related data sets.

ABSTRAK

Tujuan kajian ini dijalankan adalah untuk mengkaji hubungan di antara keselesaan termal dengan aliran udara di dalam bilik kuliah berdasarkan ujikaji dan simulasi komputer. Ruang kajian ini adalah bilik kuliah yang menggunakan sistem pengudaraan paksaan secara mekanikal. Parameter fizikal ditekankan pada kajian ini adalah halaju udara, suhu udara dan kelembapan relatif. Parameter dalaman individu dalam kajian ini juga dikenalpasti dengan kadar metabolik adalah 1.2 met dan pakaian bernilai 0.48 clo. Dalam menilai keselesaan termal di dalam bilik kuliah, piawaian yang dirujuk adalah piawaian ASHRAE 55-92, skala tujuh markah ASHRAE dan skala lima markah McIntyre. Bagi kajian pergerakan udara, perisian CFD iaitu CFX digunakan. Keputusan ujikaji dalam kajian ini akan dibandingkan dengan keputusan simulasi daripada CFX. Selain itu, perisian SPSS juga digunakan untuk menjalankan analisis stastistik.

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SYMBOL	DEFINITION
A	Area
ADPI	Air Distribution Performance Index
AMV	Actual Mean Vote
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineering
BK	*Bilik Kuliah* (Lecture Room)
BT	*Bilik Taklimat* (Lecture Room)
C	Specific Heat
CFD	Computational Fluid Dynamics
CFM	Cubic Feet Per Minutes
clo	Clothing Insulation
COP	Coefficient of Performance
div	Divergence
DK	*Dewan Kuliah* (Lecture Hall)
EDT	Effective Draft Temperature
EER	Efficiently Rating
ISO	International Standard Organization
k	Kinetic energy
KUiTTHO	*Kolej Universiti Teknologi Tun Hussein Onn*
LES	Large Eddy Simulation
met	metabolic
P	Pressure