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IMPACT OF INTERNAL AND EXTERNAL FACTORS IN BUILDING ENERGY CONSUMPTION IN SRILANKA

A dissertation submitted to the
Department of Electrical Engineering, University of Moratuwa
In partial fulfillment of the requirements for the
Degree of Master of Science in Electrical Installations

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DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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Abstract

This research describes work that covered both theoretical and practical aspects of impact of internal and external factors in building energy consumption. It gives a brief introduction of various concepts related to psychometric and cooling load of air-conditioning system which is useful for an energy optimization in building.

Various mathematical and graphical models were developed to asses the impacts and implementation issues.

An economic analysis was also carried out to help prospective users on energy savings ideas.

In addition to the direct financial savings on energy bills, various other indirect benefits to the building and environment such as extended life time of air conditioning unit reduced emission and pollution, fewer burdens on the national utility grid etc.

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Dedication

The basic idea behind this research work is to identify various possibilities, to conserve energy on an air conditioning system. Various energy optimizations were identified through mathematical modeling. Mathematical equations were derived related to the scope of the research and compared common material used in building envelope.

My dedication was focused to building envelope which is transfer media. This passes heat from outdoor to indoor and indoor to outdoor.

Results of this research may contribute to future improvements in energy consumption of buildings in srilanka.

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List of principle symbol

TR= Tone of Refrigeration
Km=kilometers
Sqkm=Square kilometers
^{0} C = Celsius
F = Fahrenheit
A.C =Air-conditioning
HVAC =Heating Ventilating and Air-conditioning
DB= Dry Bulb Temperature
T= Temperature
V= Volume
WB= Wet Bulb Temperature
kw= Kilo watt
CLTD= Cooling Load Temperature Difference
TFM= Transfer Function Method
Y= Year
M=Month
D=Day
H= Hour
DEROB-LTH= Dynamic Energy Response of Building
T=Time
RSCL =Room sensible cooling load
HVAC=Heat, Ventilation and Air conditioning
SHGF=Solar Heat gain Factor
RH =Relative humidity
BTU= British thermal unit
CLF=Cooling Load Factor
ACH= Air changes per hour
RTCL =Room total Cooling load
GLF= Glass factor
OA- Outside Air
EA=Exhaust Air.
RA =Return Air
TOU =Time of use
$CLTD_C$= Corrected cooling load temperature difference
BF =Ballast factor
W =Watts
CFM= Air infiltration rate to room
Q_L =Latent heat
Q_S = Sensible heat
V= Room volume
RLCL= Room latent cooling load
U= Overall coefficient of heat tr4ansmission
Θ =Rotated angle from south

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