BOONCHAI LERTNUWAT : DELVELOPMENT OF ENERGY SIMULATION

PROGRAM FOR BUILDINGS IN THAILAND. THESIS ADVISOR :

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A computer program to estimate energy consumption for buildings in Thailand has been developed, based on the Transfer Function Method presented in chapter 26 of ASHRAE HANDBOOK FUNDAMENTALS 1993. This program is found to be appropriate for multi-zone buildings, limited to a maximum of 97 zones. There is no limitation on the total number of walls or windows per zone. This limitation is much more relaxed than the other simulation programs on the PC now available in the market. This program has been developed into 3 parts. The first part has been devoted to calculation on hourly heat extraction rate in each zone and records the results in a data file for later use. The second part of the program, independent of the first part is used to calculate the energy consumption of the system and plant respectively. This part of the program can be extended easily and indefinitely because most of the complexities have already been overcome in the first part of the program. The third part is used to produce reports of various forms that are easily understandable.

The first two parts of the program use the actual hourly weather data as an input to calculate cooling load, heat extraction rate for each zone and energy consumption for the buildings. Testing for the calculations of cooling load, heat extraction rate and energy consumption for PTT building and comparing the results with energy audit and the results from the other programs (such as BLAST, TRACE600 and TMW-CL1) give reasonable values. Advantages of this program, compared with other programs, are the ability to accept a large number of zones and the ability to obtain the results in any useful form because the program has it own source code. The disadvantage is the simulation time taken is much longer than other programs because the program needs to read and write a lot of temporary files. Simulation time for large building, similar to PTT building, takes approximately 10 hours on a PC Pentium 133 MHz.

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