

## Abstract

This research aims at investigating the circulated water wall in reducing heat transfer into buildings in order to determine the characteristics of circulated water wall for application in Thailand. The study is divided into 2 parts: 1) to study efficiency of circulated water wall in reducing heat storage in the exterior wall of buildings, which is affected from solar radiation during the day time, and 2) to study the suitable guidelines and the usage of circulated water wall. Then, the physical models of circulated water wall are experimented in the actual climate.

The process of the research starts from the study of properties of wall materials and water including the characteristics of heat transfers of circulated water wall. The model dimension is  $90 \times 90 \times 90 \text{ cm}^3$  and it is divided into 2 sets: 1) the model with general brick wall, and 2) the model with 2.5 cm thick of circulated water wall and a pump to supply water, for comparison of efficiency between the circulated water wall and the brick wall in the same condition and facing to the south direction. The objective is to compare the wall and indoor temperatures of both models. Then the heat transfer rates in other solar energy ranges are calculated. The result shows that the circulated water wall can reduce more heat transfer than brick wall during the day time and the most efficient cooling period is at 15:00 - 17:00. Moreover, the heat transfer rate of the circulated water wall is more than the brick wall about 1.7 times. The experiment in the second part is to test the circulated water wall in 3 levels of flow rates: 4, 6.5 and 9 litre/ hr. The result shows that the 9 litre/ hr flow rate has the lowest wall temperatures and highest heat transfer rates. The comparison of Mean Cooling Potential (MCP) values of the circulated water wall shows that the flow rates of 6.5 and 9 litre/ hr have the highest MCP values of 22 and 20  $\text{W/ m}^2$

In terms of designing the suitable circulated water wall for building in Thailand, the circulated water wall should be used for reducing heat transfer in the high summer period, especially during March and May. The application of the circulated water wall is recommended to use with water flow rate of 9 litre/ hr during 9:00 - 17:00.