Thesis Title	Cooling load Reduction with Cooling Wall
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Abstract

In this research work, heat load transmission into a house with a volume of 3m x 3m x 2.5 m of which the wall facing west with dimensions of 3m x 2.5m x 0.11m has been investigated. The wall is black painted at the outside and separated in to 2 sections. The first one is a cooling wall and the rest is a normal wall. For the first a set of copper tubes is embedded at the outer surface and there is a circulation of water inside between the copper tubes and a 110 l water tank. In this study two tube spacings of the copper tubes 2.54 and 5.08 cm were considered with different flow rates of 8 and 5 l/min. The experiments were carried out in March-April 1998 as follows :

Case 1. There was water circulation in the cooling wall during 6.00-6.00 a.m. for 48 hours continuously. The inside wall temperature could be reduced 9.4 $^{\circ}$C from the ordinary wall. The highest temperature of the water in the tank was 48°C .

Case 2. There was water circulation in the cooling wall during 6.00 a.m.-15.00 p.m. then all the water was utilized and there was a new circulation from a 50 l tank. It was found that during 6.00 a.m.-15.00 p.m., the inner wall inside wall temperature could be reduced 9.3°C from the ordinary wall and the water in the tank could be up to about 50°C

A numerical simulation model has also been developed. It could be found that the simulated results of the inside wall temperature and the water temperature agree quite wall with those of the experiments. Higher water flow rate at the cooling wall results in lower the inside wall temperature and also the heat transmission. With the water flow rate of 8 l/min, the inside wall temperature could be reduced from 8.5 to 9.5 $^{\circ}$C.

The cooling wall approach could be applied in any air-conditioned building. In this study if the room is air-conditioned, the west facing cooling wall could save the every for cooling purpose of about 2,025 Baht/y.

Keywords : Cooling wall / Cooling load reduction / Energy conservation