

Abstract

In this research an experimental and numerical analysis is achieved for analysis panel shape of radiant cooling floor system with dehumidified ventilation.

The experiments were done on a model room with dimensions of (1m×0.75m×0.75m) that was built according to a suitable scale factor of (1/4) to simulate the temperature distribution by fixing 36 thermocouples in array scheme in three different zones and heights. Two cases were considered in this work, the first one was studying the parameters that have effected on floor surface temperature such as (flow rate and varied cold water temperatures) two shapes of floors (spiral and coil)are used separately. The results have showed that differences of temperature were only about 0.3°C at flow rates of (0.6l/min,1l/min,1.25l/min,2 l/min), and 0.8°C for testing varied temperatures (9.5°C,10.5°C,11.5°C,12.5°C). The temperature difference of the two shapes of floors was 0.2°C. The second was represented by satisfying thermal comfort in the iraqi climate dehumidification ventelation used to avoid condensation of water vapour that occur on the floor surface by reducing dew point of air in the space below the floor temperature. The results showed that this system is economical.

The numerical analysis was carried out using the Ansys Fluent 13 program to analysis floor and Fluent 14 to study air vertical profile, and the cases considered several parameters like; mean floor temperature, outdoor air temperature, air inlet temperature and velocity. Most of the computed results were presented as temperature contours diagrams and compared with the experimental work and these comparisons assist the use of RCF for cooling purposes in Iraqi climate for its ease, simple and good comfort performance.