NUMERICAL INVESTIGATION OF FLOW PATTERNS AND THERMAL COMFORT IN AN AIR-CONDITIONED MOSQUE

By

Eng. Redhwan Nasser Ali AL-Gabri

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfilment of the
Requirements for the Degree of
MASTER OF SCIENCE

In

MECHANICAL POWER ENGINEERING

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Summary:

The present thesis is devoted to numerical investigation of the influence of location and number of persons on airflow properties in Mosque and focuses on airflow patterns, thermal behavior and carbon dioxide dispersion in Mosque where large number of prayers standing. The study is carried out using computational fluid dynamics (CFD) simulation techniques as embedded in the commercially available CFD code (FLUENT 15). The CFD modelling techniques solved the continuity, momentum and energy conservation equations in addition to comfort parameters PMV and PPD based on Fanger's model and RNG $k - \varepsilon$ model equations for turbulence closure. The results showed that increasing of prayers numbers are a significant negative effect on the thermal comfort, thus leads to increase required convection for thermal.

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