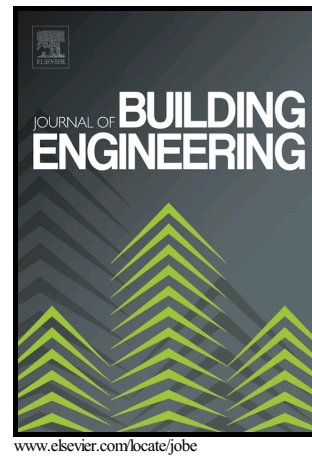


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Fayadh Mohammed Abed, Omer Khalil Ahmed, Ahmed Emad Ahmed



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# Effect of Climate and Design parameters on the Temperature Distribution of a Room

Dr. Fayadh Mohammed Abed<sup>a</sup>, Dr. Omer Khalil Ahmed<sup>b</sup>, Ahmed Emad Ahmed<sup>c</sup>

<sup>a</sup>Professor, University of Tikrit, Iraq-Salahdeen-Tikrit

<sup>b</sup>Assist Professor, Northern Technical university, Iraq-Kirkuk-Hawija

<sup>c</sup>Master student, University of Tikrit, Iraq-Salahdeen-Tikrit

## Abstract

In the hot climate countries, like Iraq where solar energy is available at large levels, solar radiation represents the most important factor of cooling load in the building. The purpose of this paper is to determine the effect of size and orientation of the window on the temperature distribution and air velocity of rooms in Kirkuk city (35.47 °N, 44.39 °E), in north Iraq. The experimental investigation contained manufacturing four test rooms where the volume of each room was 1 m<sup>3</sup> and the window areas were 25%, 50%, 75%, and 100% from facade area. The test rooms were directed in west and south directions. A numerical analysis was carried out using the Fluent software and these results were validated by comparing it with the experimental results. The hourly system performance parameters were investigated for all test situations. The results of the study showed that the window size and its direction had a great effect on the temperature distribution of the experimental rooms; also, the results showed positive effect by directing the window to the south compared with the west direction. Both results of experimental and simulation showed that the average air temperature inside test room increased during time until 2 p.m. and then decreased. Besides, the results showed that the room with 25% of the facade had the best performance in comparison with other designs. A comparison indicates a good agreement of both experimental and simulation results.

**Keywords:** Climate, Design, Parameters, Window sizes, Temperature distribution.

## Nomenclature

Symbol	Description	Units
$C_p$	Specific heat	J/kg.K
$g$	Acceleration due to gravity	m/s <sup>2</sup>
$K$	Thermal conductivity	W/m.K
$L_i$	Thickness of insulation	m
$M$	Mass	kg
$M_{tot}$	Mass of air in test room	kg
$P$	Pressure	Pa
$Ra$	Rayleigh number (Gr.Pr)	-

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