

عنوان مقاله:

The Effect of Canopy Protrusion Amount on Energy Consumption and Thermal Comfort in the Dome Structure (Case Study: Sheikh Lotfollah Mosque)

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خلاصه مقاله:

The present research aimed to investigate the relationship between the canopy performance and the gable openings of the dome structure (Sheikh Lotfollah Mosque, Isfahan City) and considered the determinants of energy consumption and thermal comfort to provide a solution to improve thermal comfort and optimize energy consumption while using clean energy in ventilation. Modeling of different modes was performed with the help of Design Builder Energy Simulator software. Further, the computational fluid dynamics (CFD) method was used to evaluate thermal performance. The parameters of the research included air velocity, relative humidity, dry air temperature, and amount of canopy protrusion. Based on the results, the lack of necessary facilities for natural ventilation led to uncomfortable conditions and lower air-flow circulation in the building, causing unfavorable thermal conditions for worshippers. Moreover, the total consumption of energy decreased by increasing the fixed-canopy protrusion amount (up to ۱.۵m). On the other hand, a higher amount (more than ۱.۵m) led to better conditions in warm months, but worse conditions were created and total energy consumption greatly increased in cold months. The research results indicated that as the protrusion of fixed canopies increased up to ۱.۵ meters, then the amount of total energy consumption also decreased. Furthermore, the protrusion of greater than ۱.۵ meters gently increased the total energy consumption. The thermal comfort index was more tolerable in hot months and a little more difficult in cold months.

کلمات کلیدی:

Dome structure, Thermal Comfort, Canopy, Sheikh Lotfollah Mosque

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