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Assessment of the Virtual Reality Approach to the Shading Design Considering Occupants Visual Comfort and Energy Analyses

Authors : Ayda Montaser Koohsari

Abstract : Predicting the occupants' behaviour and their spatial perception of a room in the first steps of the architectural design is an influential phase on buildings quality and users comfort. In this research, a real and virtual experimental and survey study is performed in a south-oriented daylit office room in Tehran- Iran. In which thirty employees are employed to answer the questions in three different times of a day, 5 blind types, and three positions for working with laptop activity. The Oculus headset is used for the virtual reality survey. In this process, the impact of daylight on their visual comfort is surveyed in 1'350 different illuminance levels which manually recorded and used the simulated model validation. The calculated DGP simplified index is used for Daylight and Glare evaluation using 5phase method in honeybee-plus for long term analyses. The window and blinds are modelled in Window LBNL software, imported as an XML file of BSDF (Bi-directional Scattering Distribution Function) material in Honeybee-plus. The results show that the occupants' perception in virtual reality is almost exaggerated compering with the satisfaction rate in actual reality. However, the results are very similar in usual conditions except for sunrise and sunset times depending on the blind state. Accordingly, the occupants' position and daytime are two important parameters in evaluating occupants visual satisfaction by virtual reality approach. Also, subdivided shadings are very effective on energy saving besides visual comfort specially when the window to wall ratio(WWR) is 90%.

Keywords : window design, WWR, occupants visual satisfaction, virtual reality. shading control, blind strategies
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