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Daylight Efficiency Prediction of Courtyard vs. Conventional Building Models Using Simulation Tool under Specific Climate Conditions

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Abstract—The major goal of the present research is to investigate in daylighting efficiency of different building typologies under specific climate conditions of hot and arid regions. It has been demonstrated in previous research that courtyards in buildings offer the ability to regulate various environments of the indoor spaces. However, in hot and arid regions lighting and protecting the building is always problematic. To estimate the degree of correlation between morphological characteristics and illuminance levels, the monitoring under clear sky during different seasons to test building models daylight efficiency using a simulation tool (DesignBuilder). The results are then used to establish the optimal design solutions. The simulation testing with geometric modifications has proved essential in carrying out a comparative analysis between the courtyard type and other Architectural morphologies such as mono block type. The courtyard type performs well in terms of daylighting. The comparative analysis determined the optimal architectural configuration, and parameters such as: courtyard opening ratio, depth, and orientation, can provide the most appropriate building typology for daylight in hot and dry areas.

Keywords—Building Typology; Daylight; Indoor Space; Simulation; Arid Zone