

## عنوان مقاله:

A Geometrical Study to Investigate the Optical Performance of Light Pipe System

## محل انتشار:

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## خلاصه مقاله:

There is considerable demand in use of light pipe system (LPS) as means of saving energy and providing natural light to indoor spaces. The main purpose of the present work is analyzing the optical performance in various geometries of domes which are located at top of LPS. In addition, a parametrical study on thickness and convexity performed on some of the domes geometry in order to achieve a better performance. Hence, a mathematical model is proposed to study optical performance of the dome of LPS. A geometrical model was designed and optical parameters in various angles of radiation were extracted from TracePro®. Furthermore, a computational model was developed in order to compute overall optical coefficient of performance, considering weighted mean of radiation angle during a year. The resulting model was verified by experiment using laboratory LPS setup. It was observed that in all domes, an increase in radiation angle from 10 up to 30 degrees leads to decrease in optical coefficient of performance (OCOP). The results also show that OCOP of simple domes have smoother variation (in range of 0.82 to 0.95) by increasing the radiation angle: whereas OCOP of modified domes keep in range of 0.65 and 1.25. It is noticeable that the hemisphere that is modified with 70 degrees prism, has a higher OCOP than 50 degrees prism in all radiation angle. Also simulation results could be useful for selecting the best dome geometry for specific region according to its latitude.

## کلمات کلیدی:

Light Pipe system, Optical performance, TracePro

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