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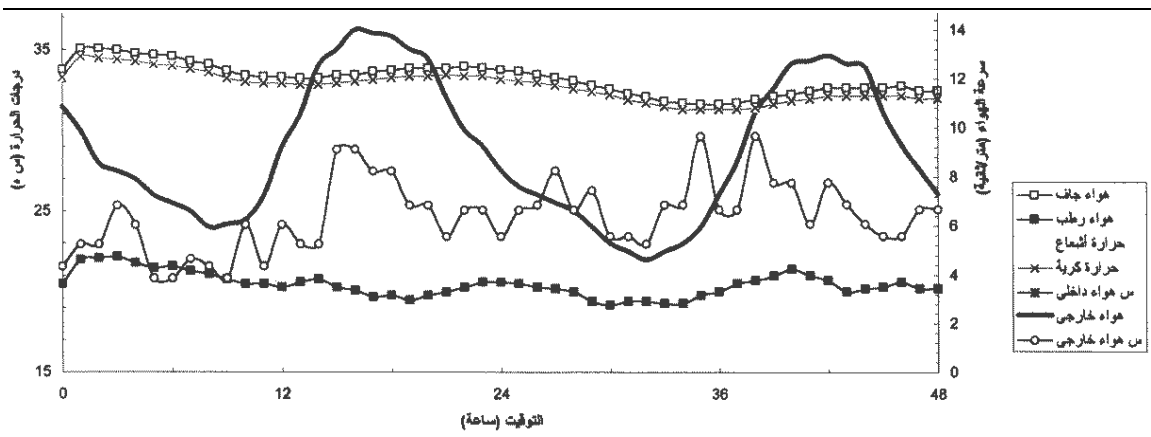
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*ASHRAE: American Society for Heating, Refrigerating and Air conditioning Engineers.

*** DOE-2 : Building Energy Simulation Software tool Developed Supported by Department Of Energy, USA.

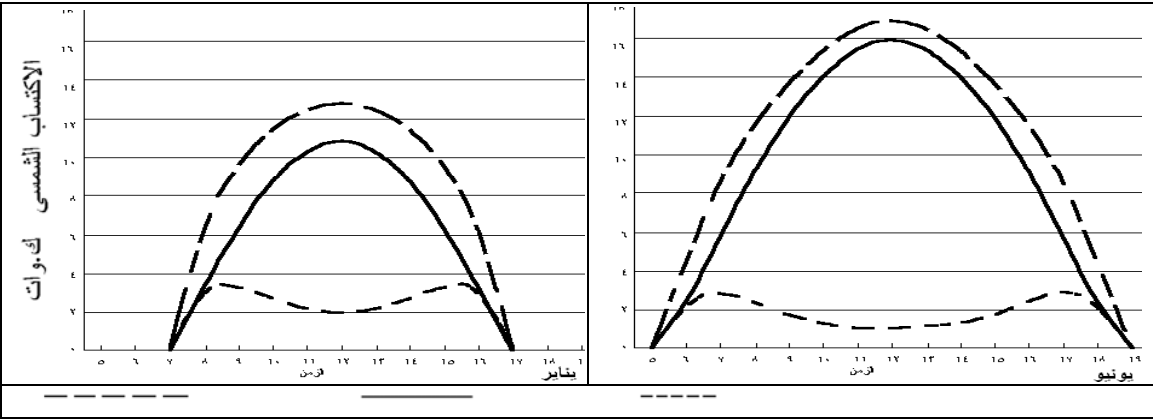
*** DOE-2 : Building Energy Simulation Software tool Developed Supported by Department Of Energy, U.S.
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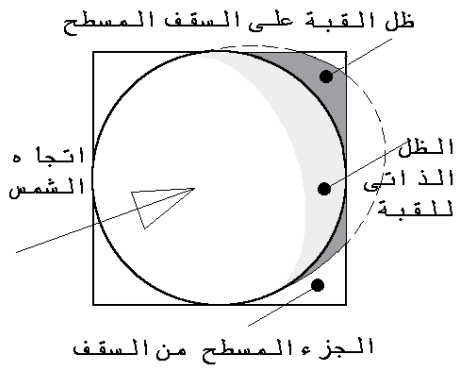
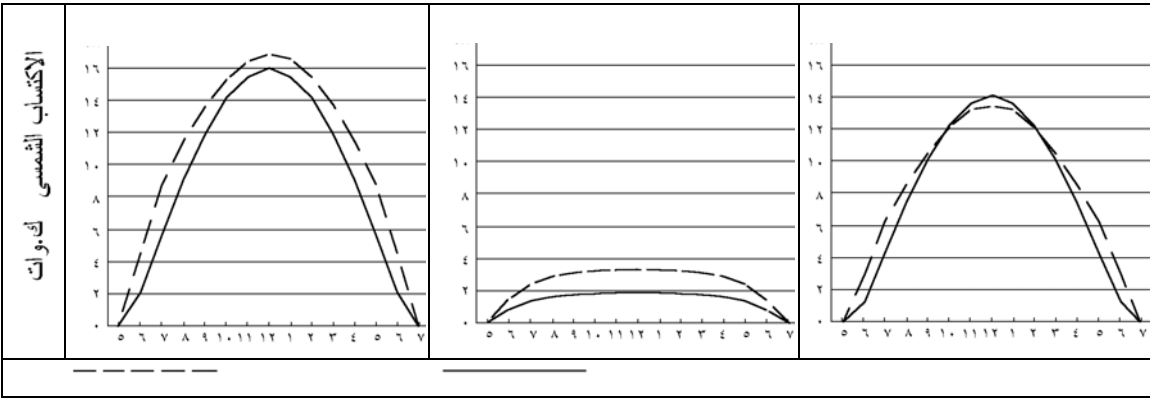
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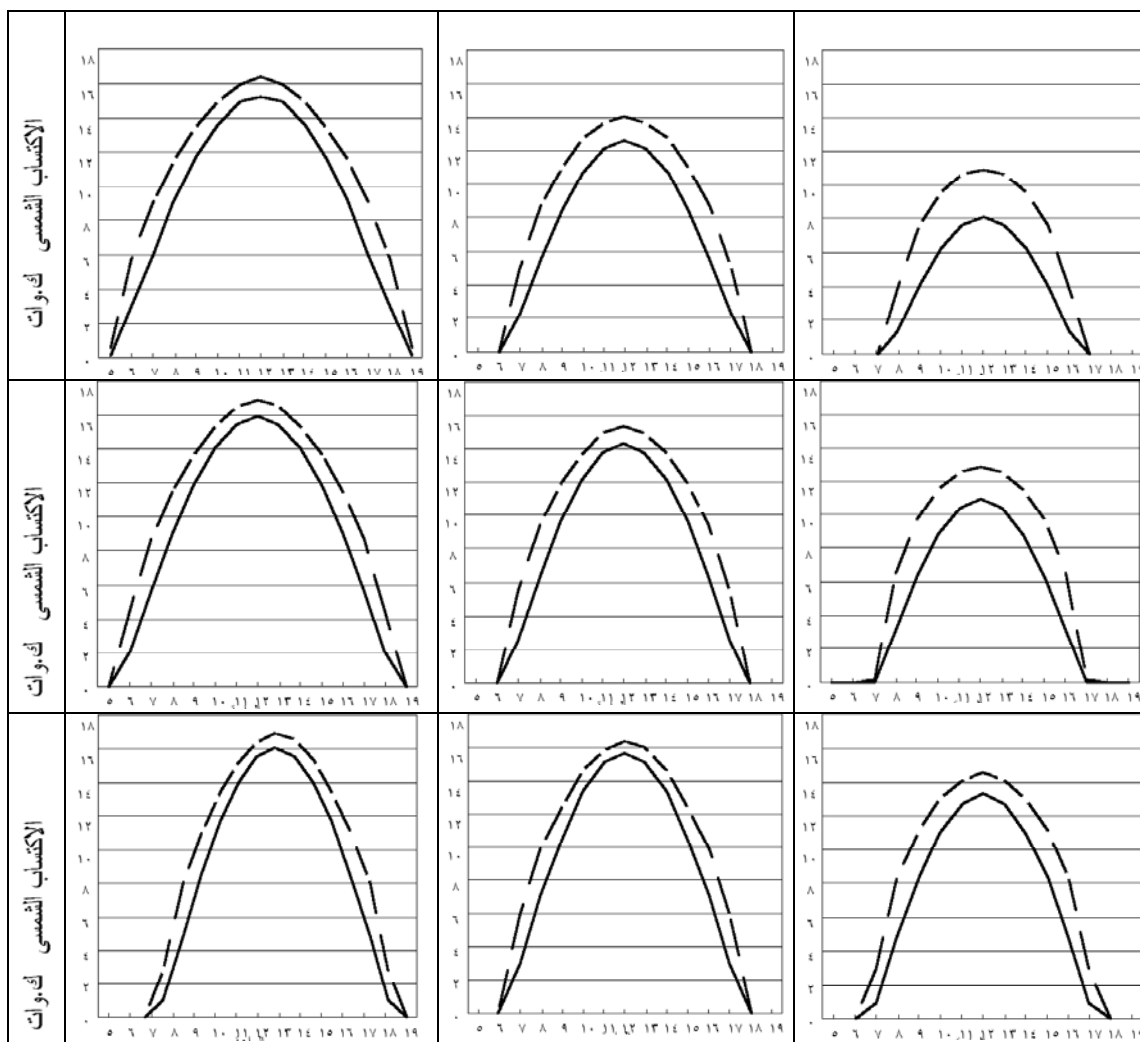
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Quantitative Evaluation of Shading Patterns of Domes And Its Impact on Roof Solar Gain

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It is common to recommend using domes for roofing as a part of desert architecture legacy in the middle east. Apart from historical and aesthetic aspects, some climatic and environmental designers believe that domes have a positive effect on climatic performance of buildings. While others believe that they don't have a climatic effect, and their use is for structural and aesthetic value only.

The aim of this paper is to evaluate the climatic performance of domes and their impact on improving the overall building performance, to reduce the uncertainty level associated with the topic.

This task is rather complicated, because domes are complicated systems that affect all aspects of thermal performance of building, so the paper starts by analyzing the performance of domes, defining the quantitative variables that represent dome's behavior

Then selecting one of them to thoroughly evaluate domes impact on it.

Solar gain of roofs was selected.

The objective of the paper is to answer the question:

Does using domes reduces solar gain of roofs or not?

A digital simulation model was built on a personal computer, the software developed by the researchers specially for this paper can evaluate solar gain due to direct and diffused radiation of both domes and flat roofs, and it simulates the domes shadow on flat parts of the roof it covers, representing this by numbers and by visual animation as well.

The calculation proved that using domes increases solar gain of roofs by 19% in summer and 43% in winter for domes built in Cairo, (30° north).

Domes built in other latitudes have the main overall pattern, differences between dome and flat roof and between summer and winter gains increase in northern latitudes and decrease closer to equator.