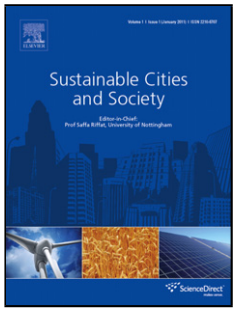

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Numerical evaluation of thermal comfort in traditional courtyards to develop new microclimate design in a hot and dry climate

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Abstract

The growing interest in thermal comfort of outdoor environments yields in different analysis on courtyards as a common space between urban and architectural scales. However, there is a limited knowledge regarding the microclimatic behavior of such spaces. Using ENVI-met simulations, this paper aims to numerically discuss the thermal performance of different configurations of traditionally designed courtyards in Shiraz, Iran, which experiences hot summers and cold winters. The geometrical effects such as orientation and H/W (height to width ratio) of courtyards are considered as potential parameters to improve the microclimatic conditions. In this paper, PMV and UTCI are used as thermal comfort indices. The obtained results indicate mean radiant temperature and wind speed as the most effective parameters for thermal comfort of courtyards. In addition, the aforementioned geometrical parameters might not be able to solely create a desirable condition, but they could significantly improve the thermal comfort of courtyards during summer and winter. To achieve a desirable thermal comfort level, the results suggest using