

Experimental Study of Reflective Roof as a Passive Cooling Method in Homes Under the Paradigm of Appropriate Technology

Authors : Javier Ascanio Villabona, Brayan Eduardo Tarazona Romero, Camilo Leonardo Sandoval Rodriguez, Arly Dario Rincon, Omar Lengerke Perez

Abstract : Efficient energy consumption in the housing sector in relation to refrigeration is a concern in the construction and rehabilitation of houses in tropical areas. Thermal comfort is aggravated by heat gain on the roof surface by heat gains. Thus, in the group of passive cooling techniques, one of the practices and technologies in solar control that provide improvements in comfortable conditions are thermal insulation or geometric changes of the roofs. On the other hand, methods with reflection and radiation are the methods used to decrease heat gain by facilitating the removal of excess heat inside a building to maintain a comfortable environment. Since the potential of these techniques varies in different climatic zones, their application in different zones should be examined. This research is based on the experimental study of a prototype of a roof radiator as a method of passive cooling in homes, which was developed through an experimental research methodology making measurements in a prototype built by means of the paradigm of appropriate technology, with the aim of establishing an initial behavior of the internal temperature resulting from the climate of the external environment. As a starting point, a selection matrix was made to identify the typologies of passive cooling systems to model the system and its subsequent implementation, establishing its constructive characteristics. Step followed by the measurement of the climatic variables (outside the prototype) and microclimatic variables (inside the prototype) to obtain a database to be analyzed. As a final result, the decrease in temperature that occurs inside the chamber with respect to the outside temperature was evidenced. likewise, a linearity in its behavior in relation to the variations of the climatic variables.

Keywords : appropriate technology, enveloping, energy efficiency, passive cooling

Conference Title : ICASBE 2023 : International Conference on Architecture and Sustainable Built Environment

Conference Location : Barcelona, Spain

Conference Dates : June 19-20, 2023