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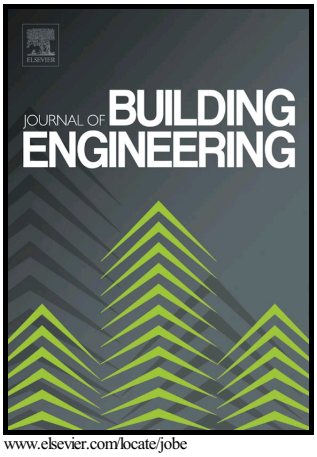


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# A Study on the Thermal Behavior of Traditional Residential Buildings: Rasoulian House Case study

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## Abstract

Traditional buildings throughout the globe provide instructive examples of sustainable solutions to building design problems. In recent years, researchers and architects have conducted different studies that represent the principles of Iran's climate-responsive architecture. Yazd traditional buildings are examples of Iranian architecture that bear characteristics of environmentally friendly buildings. Thermal performance and comfort condition of these buildings in summer have been the matter of interest in recent studies.

In this article, summer sections of Yazd traditional homes and their thermal behavior were studied. Yazd is located in hot and arid regions of Iran. EnergyPlus software program was used to investigate the thermal behavior of this house. To validate the developed model, a field study was carried out with lascar electronics data logger. The results reveal that internal temperature of summer sections in all seasons has less fluctuation than the outdoor temperature. Also, weather temperature in underground spaces is closer to the comfort temperature in comparison with spaces near to the ground floor. Therefore, to provide thermal comfort condition in these homes the least amount of non-renewable energy is needed.

**Keywords**: Traditional Buildings, Summer sections, Energyplus Simulation, Field Measurement



## Introduction

Buildings account for 45% of worldwide energy use. Urban residential sector is one of the main contributors of energy consumption in each country [1]. In recent years, due to the building's impact on the environment (more than any other human activity), researchers and architects have focused to find sustainable solutions reducing energy consumption and negative environmental impacts. Vernacular buildings across the globe provide instructive examples of sustainable solutions to building problems [2]. It is believed that sustainable architecture can be achieved by using “the best of the new and the best of the old”[3]. Consequently, researchers assess different aspects of vernacular buildings to understand and identify sustainability principles applied in these buildings. Certain construction features for shelter and protection and the need to create the tolerable levels of comfort were considered in ancient design and not surprisingly, still remain important today [4].