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THERMAL ANALYSIS OF LIGHT WEIGHT WALL MADE FROM SANDWICH PANELS IN THE ASPECT OF THERMAL INSULATION DESIGN FOR SUSTAINABLE BUILT ENVIRONMENT

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ABSTRACT

Based on the energy saving design in cold winter and hot summer zone like Iraq weather conditions, a prototype of sandwich wall panel (SWP) is analyzed by COMSOL Multiphysics ver. 5.0 programme. A new design of sandwich wall panel that enhances thermal insulation of Iraqi buildings by adding an insulating multilayer inside the wall is presented. The thermophysical properties of the insulating multilayer SWP, the external environment impact (solar irradiation, temperature, wind speed, etc.) and durability are taken into account. The major influence of solar irradiation is highlighted as it can increase heat transfer crossing the insulation wall. The result showed, the proposed sandwich wall panel can effectively save a significant amount of energy consumption in terms of electricity spent on heating and cooling. The thermal conductivity, convective heat transfer coefficient, specific heat, density, capacity, and surface emissivity of materials are necessary to evaluate the temperature distribution and the performance of the suggested sandwich wall panel.

Keywords: thermal performance, sandwich wall panel, light weight wall.

1. INTRODUCTION

The majority of brick walls are continually exposed to environment, which makes the walls focused to the solar radiation unavoidably. As a result, higher temperature in Summer and lower temperature in winter is one of the most important factors affecting living in the buildings.

The thermal energy of the building is priority areas of development. In the near zero energy building consumption, the energy consumption from the external walls ranging between 60% ~ 70% [1]. Therefore, more demand is put on the materials and formation design in external panel of building. On my point of view, the more functions are confirmed on the material used in walls of the building, such as the environmental effect (warm weather and cold weather), waterproof property, fireproof property and wall durability. Sandwich wall panel (SWP) is one of the best options to overcome the warm and cool in summer and winter seasons respectively. The Sandwich wall panel consists of a lightweight core and two rigid faces[2]. The importance of the thermal energy flux through a sandwich wall panel has been presented by [3]. The thermal performance of concrete three-wythe sandwich wall panels with two-wythe sandwich wall panels have been compared by [4]. Some analytical models proposed for a dynamic non-linear by using

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