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Development of a composite prototype with GFRP profiles and sandwich panels used as a floor module of an emergency house

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Abstract

A series of experimental tests carried out on a composite prototype to be used as a floor module of an emergency house is presented in this paper. The prototype comprises a frame structure formed by GFRP pultruded profiles, and two sandwich panels constituted by GFRP skins and a polyurethane foam core that configures the floor slab. The present work is part of the project “ClickHouse – Development of a prefabricated emergency house prototype made of composites materials” and investigates the feasibility of the assemblage process of the prototype and performance to support load conditions typical of residential houses. Furthermore, sandwich panels are also independently tested, analysing their flexural response, failure mechanisms and creep behaviour. Obtained results confirm the good performance of the prototype to be used as floor module of an emergency housing, with a good mechanical behaviour and the capacity of being transported to the disaster areas in the form of various low weight segments, and rapidly installed. Additionally, finite element simulations were carried out to assess the stress distributions in the prototype components and to evaluate the global behaviour and load transfer mechanism of the connections.

Keywords: emergency house; composite materials; GFRP pultruded profiles; sandwich panels; GFRP skins; PU foam core.

1. Introduction

Typically, after a natural disaster, the surviving communities are accommodated in temporary dwellings for recovery [1]. Availability of temporary housing is crucial since it allows people to quickly commence their daily activities such as school, working and cooking [1-3]. In the field of temporary houses design, one of the critical

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