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Structural Response of Modular Buildings – An Overview

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Prefabrication by off-site manufacturing leads to a reduced overall construction schedule, improved quality, and reduced resource wastage. Modular building is therefore increasingly popular and promoted. With the recent promotion a number of relevant studies have been completed, however, a review of the design, construction, and performance of modular buildings under different loading conditions is lacking. This paper presents a state-of-the-art review of modular building structures. First, structural forms and construction materials are presented as a brief introduction to the modular structures. Modular building is shown to refer not to a single structure type, but a variety of structural systems and materials. These modular structures might perform differently to similar traditional structures and the structural performance is highly dependent on inter- and intra-module connections. The structural response of modules to different hazards is then considered, followed by the current design practice and methodology. As a currently developing area there is great potential for innovation in modular structures and several key research areas are identified for further work.

Keywords: modular building, prefabrication, off-site fabrication, multi-hazard

1. Introduction

Modular building is a construction technique whereby building modules are prefabricated off-site. It is a type of off-site fabrication referring specifically to volumetric units which may be a structural element of a building [1-4]. Modular building refers to the application of a variety of structural systems and building materials, rather than a single type of structure. Prefabrication by off-site manufacturing leads to a reduced overall construction schedule, improved quality, and reduced resource wastage [5-7]. The disadvantages include the lack of design guidance and