

Earthquake Responses of Masonry Structures

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Abstract

This paper studies and analyzes the response and ductility of masonry structures in earthquake zones. The non-linear dynamic response of masonry structures were obtained using three simulated models, which were subjected to UBC code dynamic and static equivalent earthquake loads. The ductility and maximum response of the structural models were compiled and analyzed in order to draw recommendations for preliminary design of masonry structures in earthquake zones.

Introduction

The seismic resistance evaluation of civil engineering structures represents a subject of high practical value and interest. The social and political interest on this subject has recently grown as a consequence of the repetitive dramatic building failures associated with the recent earthquake events. These dramatic failures have led some countries to revise their existing building codes and to re-classify their country's seismic zones. In order to estimate the seismic vulnerability of existing buildings and to establish if the structure requires a seismic upgrade, many authors developed simplified methodologies to simulate the non-linear behavior of masonry buildings. These methodologies provide sufficiently accurate results for engineering practice purposes [1-6]. While the above research studies have contributed to the improvement of estimation of the seismic evaluation of existing masonry structures, there has been little or no reported research focusing on the preliminary design of masonry structures in seismic zones.

This paper studies and analyzes the response and ductility of masonry structures in earthquake zones in order to draw recommendations for the preliminary design of masonry structures. The numerical data on non-linear dynamic responses were obtained using three simulated computer models subjected to earthquake loads. The response of masonry structures made of solid or hollow blocks or bricks were computed, documented, and analyzed. Recommendations for the preliminary design of masonry structures in seismic zones were drawn at the end.