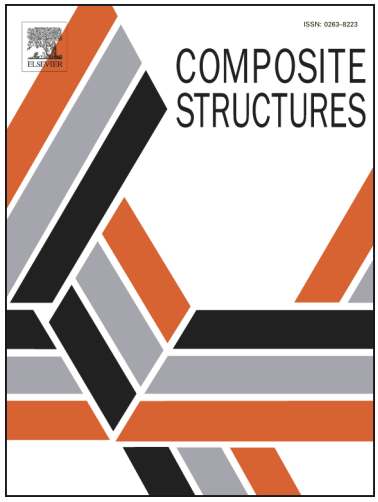

Experimental and numerical studies on seismic performance of traditional style steel-concrete composite frame

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Experimental and numerical studies on seismic performance of traditional style steel-concrete composite frame

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Abstract. In order to study the seismic performance of a Chinese traditional style steel-concrete composite frame, a half-scale prototype was designed for a region with intensity seven in the Chinese seismic design code. In the experiment, the El Centro, Taft, Lanzhou and Wenchuan ground motions with different peak accelerations (0.035g, 0.1g, 0.22g, 0.4g) were used to simulate earthquakes of different characteristics and intensities. The displacement response, restoring force and acceleration response of the measured structure were analyzed, and the hysteresis characteristics, failure mechanism, deformability and energy dissipation capacity of the model quantified. The results show that the damage caused is concentrated in the beams and at the transition zone between the upper and lower column as evidenced by noticeable pinching of the hysteresis curves. The ultimate story drift reached is about 1/157 - 1/153 (0.65%), satisfying the elastic-plastic limits in the code. At a peak acceleration of 0.4g, the stiffness of the specimen is 66% lower than that at a peak acceleration of 0.035g. The most obvious structural response is under the excitation of El Centro wave, while the smallest is under the action of Wenchuan ground motion. The finite element software SAP2000 was used to analyze the failure of the specimen, the displacement time history curve and sequence of the plastic hinges. The calculated values of the finite element are in reasonable agreement with the experimental values, which can supply some reference to the practical engineering application.

Keyword: traditional style building; steel-concrete composite frame; pseudo-dynamic test; seismic performance; time-history analysis.

1. Introduction

China has a long history, and the development of Chinese culture can be tracked through the architecture of its

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