



Failure Pattern of Double-layer Lattice Structure and Its Experimental Studies with Isolated Supports

Gui-Bo Nie*, Junwu Dai, Xu-Dong Zhi, Feng Fan

* *Presenting Author*

Corresponding Author: Guibo Nie

Contact Email: nieguibo2014@gmail.com

ABSTRACT

Typical failure patterns of the member, support and joint were observed in space double-layer lattice structure the 2013 M7.0 Lushan earthquake in Sichuan province of China. Various isolation devices have been implemented in recent years to enhance structural performance by reducing the dynamic responses. However, the isolation devices served mostly with either horizontal isolation or vertical isolation which was not applicable for synchronous isolation in both horizontal and vertical isolation. Therefore, an innovative isolated devices used for three-dimensional isolation was invented. In order to verify the feasibility of using the isolated devices to reduce the seismic response of double-layer lattice structure under small to strong earthquakes, a scaled model before and after application of the isolated devices were conducted by shaking table test. And then seismic wave of prototype, dynamic characteristics, seismic performance and failure pattern of the model with or without the isolated devices were discussed based on the seismic responses including the acceleration, displacement and strains gathered at the members. Furthermore, Results of the test indicated that the seismic effect is underestimated without regard to the dynamic amplification effect of the RC structures underneath, which leads to the failure of structures. At last, the compared experimental results indicated that the isolated devices had a remarkable earthquake isolation action in both horizontal and vertical directions.

KEYWORDS: *Double-layer lattice structure; Isolated devices; Shaking table test; Dynamic characteristic; Seismic isolation; Seismic response*