Seismic performance analysis of a concrete filled steel tubes arch bridge: A parametric study

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Abstract

Numerical method was widely used in bridge seismic performance analysis, but the diversity and complexity structures increased trouble in the modelling process. This paper presented a systematic, universal and flexible bridge numerical modelling method, and the seismic performance of a concrete filled steel tubes arch bridge was studied. The geometric/attribute model involved structural/stiffness equivalence, and the bridge parametric modeling strategy combined commercial computer-aided design language of software MATLAB and ANSYS. Data exchange in different fields and rapid reconstruction of numerical model were realized. Finally, the vibration mode, deformation and internal force of the bridge under seismic load was studied. The results indicated that the proposed parametric model formed a complete data transfer process, and the bridge model rapidly modified and reconstructed. The numerical calculation efficiency was greatly improved because of the structure element was employed instead of solid element. The displacement and internal force of arch rib were mainly controlled by lateral load under horizontal uni-input, and the combined horizontal and vertical load should be considered in seismic design. The leaning angle and width-span ratio of transverse braces are considered to improve the seismic performance of bridges.

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