



Seismic responses of Baozhusi gravity dam upon MS 8.0 Wenchuan Earthquake

Y. Xu and C.H. Zhang

State Key Laboratory of Hydrosience and Engineering, Tsinghua University, Beijing, China (xuyanjie@tsinghua.edu.cn)

Baozhusi gravity dam was not destructively damaged during the Ms 8.0 Wenchuan Earthquake even though the earthquake intensity (0.2g) at the dam site exceeded the design level of the dam (0.1g). In order to analyze the dam's performance to resist the earthquake, we design a three-dimensional model to simulate the dam's dynamic responses with finite element modeling scheme with consideration of the nonlinearities of contraction joint opening and different combination patterns of three-component seismic processes. Then with 2D elasto-plastic yielding analysis technique we reassess the seismic safety and discuss the possible destruction modals of the dam during strong earthquake with updated seismic fortification levels. The results demonstrate that (1) the cross-stream component of earthquake motion predominates in the dynamic responses of the dam, and the stream component has relatively weaker excitation to the dam, which are probably the reason that the dam luckily avoided strong damage in the Wenchuan Earthquake; (2) the concrete fracture occurred near the permanent contraction joints at the top of the dam may have resulted from the impact of concrete blocks during joints opening; (3) the dam safety can meet the requirement under the updated design earthquake (0.27g) and will be lower under the maximum credible earthquake (0.32g), which may affect the reservoir operating and the resistant abilities to aftershocks.