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INVESTIGATING THE EFFECTS OF VERTICAL JOINT ON THE SEISMIC BEHAVIOR OF ARCHED CONCRETE DAMS UNDER NON UNIFORM EXCITATION (CASE STUDY OF KARUN4 DAM)

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Dam behavior investigation has been considered for a long time, with many studies conducted to identify and predict factors influencing such structures (Bi & Hao, 2011). In common dynamic analyses of dams, an input acceleration is typically used (Hariri-Ardebili et al., 2014). At the same time, it was proved that such structures with a large contact with the ground usually experience different accelerations in their various supporting points (Konakli & Der Kiureghian, 2012). Applying different accelerations on different supports of a structure can increase their stresses and displacements. The stresses can be among factors affecting dam stability (Tarinejad et al., 2017). Thus, it is very important to accurately study its effect on the dynamic behavior of arc concrete dams.

Also vertical joint issues are considered with uniform and non-uniform excitation, because comparing both of them; help to show effects on the joints such as displacement and stress. Furthermore, in most arc dam analyses, their bodies have been treated as integrated, while such dams are constructed by putting together concrete blocks with vertical joints in practice. In the current study, after building an ABAQUS three-dimensional model of Karoon-4 Dam as the tallest arc concrete dam in Iran, it was attempted to apply the vertical joints to compare the dynamic behavior of arc concrete dams under uniform and non-uniform analyses and the case in which the dam body is modeled in an integrated form. The results revealed that the non-uniform analysis increased the stresses and displacement of the dam body. In addition, as expected, the vertical joints exerted a damper-like behavior and reduce stresses and displacement of the dam body.

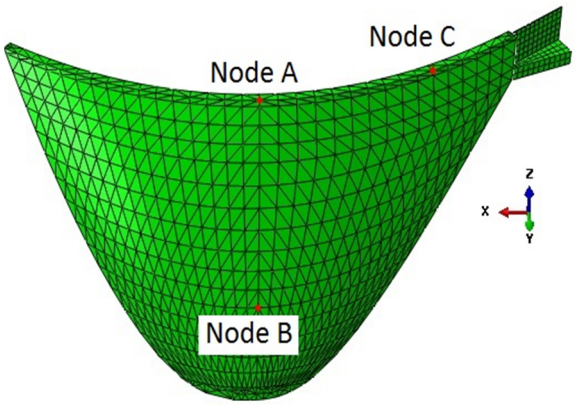

Figure 1. Three studied points on crest and right and middle part of the dam.

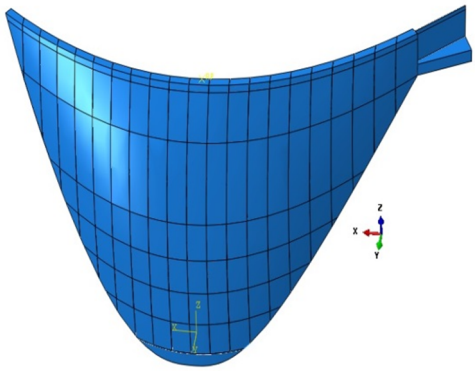

Figure 2. Vertical joints among blocks in Karun4 dam.

Table 1. Maximum displacement (on meter) of dynamic analysis.

0.21	Point A	Dam without vertical joint	Unifrom Analys
0.11	Point B		
0.9	Point C		
0.10	Point A	Dam with vertical joint	
0.10	Point B		
0.15	Point C		
0.22	Point A	Dam without vertical joint	Non-Uniform Analys
0.6	Point B		
0.12	Point C		
0.11	Point A	Dam with vertical joint	
0.9	Point B		
0.10	Point C		

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