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Research of air-cushion isolation effects on high arch dam reservoir

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Abstract A three-dimensional (3D) finite element model of air-cushion isolated arch dam is presented with the nonlinear gas-liquid-solid multi-field dynamic coupling effect taken into account. In this model, the displacement formulation in Lagrange method, pressure formulation in Euler method, nonlinear contact model based on Coulomb friction law are applied to the air-cushion, reservoir and contraction joint domain, respectively. The dynamic response of Jinping I arch dam with a height of 305m is analyzed using the seismic records of the Wenchuan Earthquake in 2008. Numerical results show that the air-cushion isolation reduces significantly the hydrodynamic pressure as well as the opening width for the contraction joints of high arch dam.

Keywords: 气幕 气-液-固多相耦合 横缝 动水压力 汶川地震波

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