

Seismic Response of Concrete Gravity Dams considering Hydrodynamic Effects

***M. B. Sawant¹ and A. Dey¹**

¹Indian Institute of Technology Guwahati, Assam, India.

*Corresponding author: arindam.dey@iitg.ernet.in

Massive concrete gravity dams supporting huge water reservoir are subjected to hydrodynamic forces resulting from the time-dependent stresses generated at the reservoir water-dam interface. Indian Standard Code (IS 1893-1984) suggests considering hydrodynamic pressure that varies with depth of reservoir and shape of the dam, similar to a pseudo-static analysis. Such an assumption leads to largely conservative analysis and over-safe design. This article reports the response of the Pine Flat Dam under seismic conditions considering hydrodynamic stresses on the upstream face, varying both spatially and temporally. The Kern County seismic ground motion has been chosen for the analysis, for which both S69E and vertical component of accelerations have been considered along with their combined action. GeoStudio 2007 modules of Sigma/W and Quake/W have been used in unison to achieve the modeling. The study illustrates a significant variation in the estimated seismic response when the hydrodynamic forces are included in the design.

Keywords: Concrete gravity dam, Seismic response, Hydrodynamic effect, Geo-Studio 2007