

Variation of Base Width of a Typical Concrete Gravity Dam under Different Seismic Conditions Using Static Seismic Loading

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Abstract : A concrete gravity dam is a major hydraulic structure and it is very essential to consider the earthquake forces, to get a proper design base width, so that the entire weight of the dam resists the overturning moment due to earthquake and other forces. The main objective of this study is to obtain the design base width of a dam for different seismic conditions by varying the earthquake coefficients in both vertical and horizontal directions. This shall be done by equating the factor of safety against overturning, factor of safety against sliding and factor of safety against shear friction factor for a dam with their limiting values, under both tail water and no tail water condition. The shape of the Mettur dam in India is considered for the study. The study has been done taking a constant head of water at the reservoir, which is the maximum reservoir water level and a constant height of tail water. Using linear approximation method of Newton Raphson, the obtained equations against different factors of safety under different earthquake conditions are solved using a programme in C++ to get different values of base width of dam for varying earthquake conditions.

Keywords : design base width, horizontal earthquake coefficient, tail water, vertical earthquake coefficient

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