

Stability Analysis of Gravity Dam using Matlab Programming

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Abstract: Gravity dams are critical structures in civil engineering, designed to withstand the immense forces exerted by water pressure and gravity. Ensuring their stability is paramount to prevent catastrophic failures that could result in significant economic and environmental consequences. This study presents a comprehensive stability analysis of a gravity dam using MATLAB programming.

The analysis focuses on evaluating the structural integrity and safety factors of the dam under various loading conditions, including hydrostatic pressure and seismic forces. MATLAB's computational capabilities are utilized to perform rigorous numerical simulations, incorporating finite element analysis (FEA) and stability criteria assessments.

Key aspects of the stability analysis include the determination of critical failure modes such as sliding, overturning, and base pressure distribution. Through MATLAB programming, the study explores different dam geometries and material properties to assess their influence on overall stability.

Furthermore, sensitivity analyses are conducted to investigate the impact of uncertainties in input parameters on the dam's stability margins. This provides insights into potential weak points and allows for optimization of design parameters to enhance dam safety.

Keywords: Gravity dams