Finite Element Analysis of Levee Stability for Flood Early Warning Systems
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FINITE ELEMENT ANALYSIS OF LEVEE STABILITY FOR FLOOD EARLY WARNING SYSTEMS

Summary

Floods are common natural disasters frequently taking their dramatic toll in global warming conditions. Hundreds and thousands kilometres of sensor-monitored flood protection barriers are built at the coastlines all over the world. The power of computational science helps levee maintainers in tracing early signs of failure and taking efficient steps to minimize possible losses. In the early warning system (EWS) workflow, finite element analysis of levee stability works in parallel with data-driven approach, assessing safety margin under real-life loads measured by sensors. Deep understanding of complex physical processes happening in a levee at failure is the key to its realistic simulation and prediction. A perfect levee stability analysis module within an early warning system of future must satisfy two contradicting demands: realism and complexity of mathematical models involved in the analyses via robust and fast work in real-time workflow of the EWS. The thesis summarizes efforts in building such a module called "*Virtual Dike*", with its validation on the three real-life monitored levees, including levee failure cases analyses.