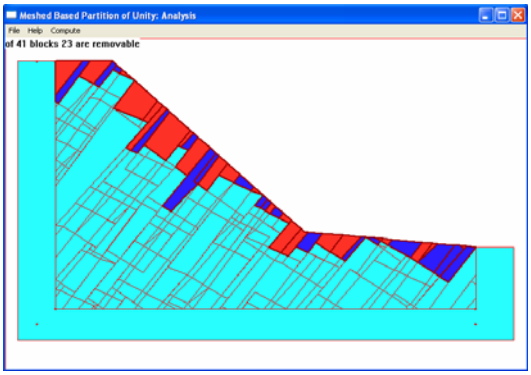
US Army Corps of Engineers®

Water Resources Infrastructure R&D Program

Unlined Spillway Erosion

Description

Previous research conducted under this work unit produced a rock surface spillway erosion risk assessment used to develop the Spillway Erosion Tool Box. Flow through rock surface spillways due to severe flood events has the potential to erode spillway and causes a substantial head-cut migration. The progression of erosion may cause spillway breach and results in a catastrophic release from the reservoir. The mechanic of rock erosion includes the amount of energy of the water that flows through the spillways and the behavior of geologic materials in resisting the erosion. The current effort involves advancing the risk assessment approach by adding Latin Hypercube Sampling (LHS) to produce a more detailed analysis.



Benefits

The results of this research would greatly contribute to a better understanding of the mechanic of rock erosion on unlined spillway due to turbulent flow. The technology will be useful for analyzing many USACE rock surface spillways in a more rigorous way.

Status

The Unlined Spillway Erosion Toolbox is a beta version.

The Modified Guidance for SITES with Latin Hypercube will be published in Summer 2009.

Distribution Source(s)

The Spillway Erosion Toolbox is available from the Portfolio Risk Assessment (PRA) team in Louisville District.

Available Documentation

Wibowo, J.L., Henn III, K., and Villanueva, E., 2009. Unlined Spillway Erosion Toolbox for Type 2 Risk Assessments of Dams. Guidance for using the toolbox (Draft), Vicksburg, MS - Louisville, KY

Villanueva, E., and Wibowo, J. L. (2008). Risk Assessment of Rock Surface Spillway Erosion Using Parametric Studies. Technical Report TR-08-22, ERDC, Vicksburg.

Lin, J.S. and Wibowo, J., 2008. Stability Analysis of Rock Surface Spillway Using a Partition of Unity Method. Proceedings of the 42nd US Rock Mechanics Mechanics Symposium, San Francisco, California.

Neilsen, M.L., Temple, D.M. and Wibowo, J.L., 2006. Analysis of Spillway Erosion Rate Parameters. Proceedings of the IASTED International Conference on Environmental Modeling and Simulation (EMS 2006), St. Thomas, USVI.

Wibowo, J.L., Yule, D.E., Villanueva, E., Temple, D.M. 2005. Earth and rock surface spillway erosion risk assessment. Proceedings of the 40th US Rock Mechanics Symposium, Anchorage, Alaska.

Neilsen, M.L., Temple, D.M. and Wibowo, J.L., 2004. A distributed hydrologic simulation environment with latin hypercube sampling, In Proceedings of the IASTED International Conference on Environmental Modeling and Simulation (EMS 2004), St. Thomas, USVI.

Temple, D.M., Wibowo, J., Neilsen, M. Erosion of earth spillways. 2003. Proceedings of 2003 USSD Annual Meeting and Conference. Charleston, SC: U.S. Society of Dams.

Available Training

The training how to use the unlined spillway erosion tool box is available through Port folio Risk Assessment (PRA) training by Louisville District (LRL)

Available Support

Dr. Johannes Wibowo and Evelyn Villanueva

Application

The Unlined Spillway Erosion risk assessment using logistic regression has been used to develop Unlined Spillway Erosion Toolbox.

Point of Contact

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