

Annonce de conférence

Mardi 22 2018 à 17:15,
(<http://plan.epfl.ch/?lang=en&room=GC+B3+30>)

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Complementary Methods for Determining the Sedimentation and Flushing in a Reservoir

Flushing operations of large dam reservoirs aim at releasing trapped sediment. Flushing is one possible solution to mitigate the nuisances caused by reservoir impounding on sediment balance across the river basin, as well as a solution to prevent blockage of safety works (e.g. bottom outlets) or excessive entrainment of sediment in the water withdrawal structures (e.g. power waterways). The presentation will focus on the changes expected in the Paute River in Ecuador as a result of the future construction of the Paute-Cardenillo Dam (double-curvature arch dam with a maximum height of 135 m), situated approx. 23 km downstream from the Amaluza Dam. The study area is approx. 275 km² and the average slope of the reservoir river reach is 0.05 m/m. The complex phenomena of sedimentation and flushing were analyzed by using four interrelated methodologies: empirical formulations, 1D, 2D and 3D simulations. The erosion and sedimentation simulation were carried out with 1D HEC-RAS program. The flushing operation was simulated with 2D Iber program (Fig. 1b) and 3D FLOW-3D program.

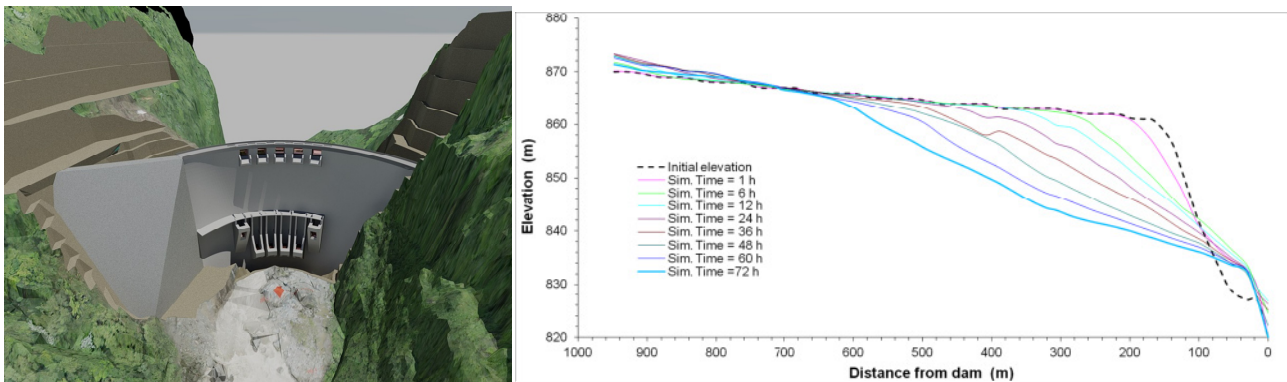


Figure 1 – (a) Illustration of the Paute-Cardenillo dam. b) Level of sediments before and after a flushing.

Suspended fine sediments in the reservoir can result in certain cohesion of the deposited sediments, which might influence the flushing procedure. Carrying out a flushing operation every 4 months, the cohesion effect in increasing the shear stress will be avoided. Sensitivity analysis must be performed to prove the models are robust to various inputs and not only to one single scenario. Some parameters need to be considered to reduce this uncertainty in numerical modeling (turbulence parameters, estimated volumetric sediment concentration and sensitivity to roughness).

The Final Design of the dam and associated hydropower scheme have been completed recently. Construction of the dam is scheduled to start soon. Cardenillo is the fourth stage of the Complete Paute Hydropower Project that also includes the Mazar, Amaluza - Daniel Palacios and Molino - Sopladora components. Routing of sediment across this cascade of reservoirs is key to the sustainable use of hydropower potential in the region.

Short bio: Luis G. Castillo is Titular Professor at the Technical University of Cartagena (Spain) since 2002). He is an expert in Hydraulics Engineering, with degrees in Civil Engineering ME in 1985 from the Central University (Ecuador) and 1987 from Technical University of Madrid (Spain). He obtained his PhD from Technical University of Catalunya (Spain) in 1990. In his thirty-year career, he has worked in some of the principal engineering companies of Spain, having executed over one hundred reports, studies and projects in hydrology, water resources, dams, irrigation systems and fluvial engineering. His principal research interests are in topics related to flash floods, spillways and energy dissipators, hyperconcentrated flows, hydrologic and hydraulic characterization of semi arid zones.

Durée de la conférence: env. 45 minutes, suivie d'une discussion et d'un apéritif.

Dr Giovanni DE CESARE & Dr Pedro MANSO

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