

Numerical analyses of concrete buttress dams to design dam monitoring

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Why was this topic researched?

Because old concrete buttress dams are sensitive to cracking if they are exposed to large temperature variations. The cracks can make dams sensitive to failure, depending on the size and location of the cracks.

The best way to make sure the dam is functioning as expected is to monitor the behavior of the dam through different sensors.

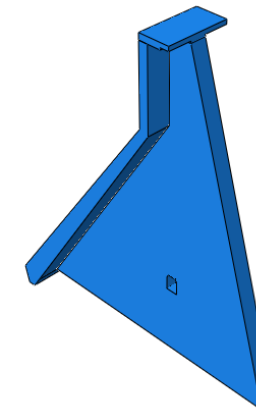
The main purpose for this project was to develop a finite element model that could be used to simulate the real behavior of a concrete buttress dam and predict the future behavior of the dam. This made it possible to determine alert and alarm values for monitoring equipment installed on the dam.

And how this was done is described on the next page.

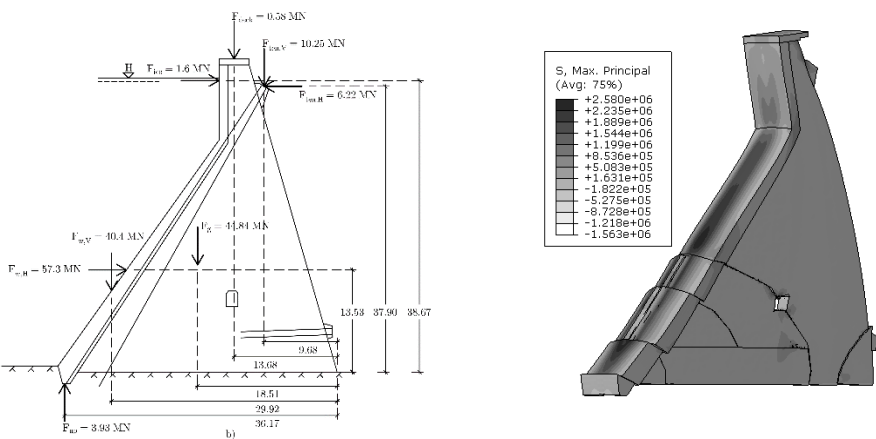
A method was created

- Physical structure to a mathematical model
 - > Finite element model
- Find mesh convergence
- Calibration of the model
- Evaluation of the calibration
- Analyses
 - > Establish normal variation
 - > Failure analyses

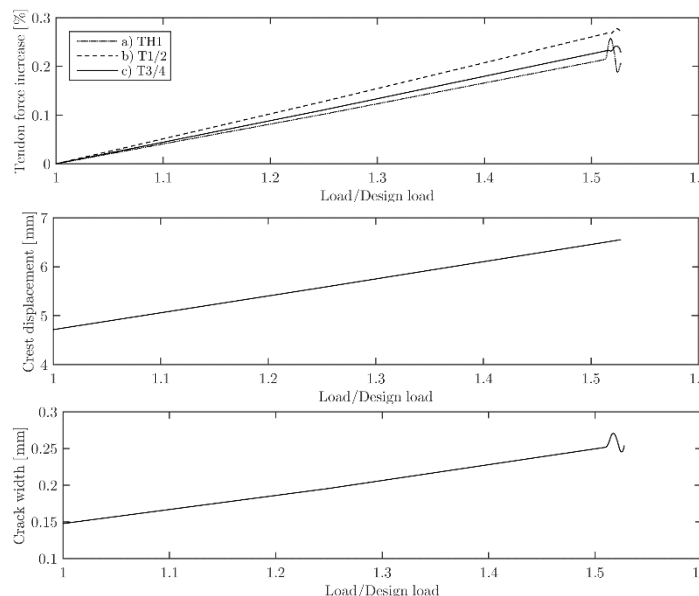
A case study on a real concrete buttress dam was made



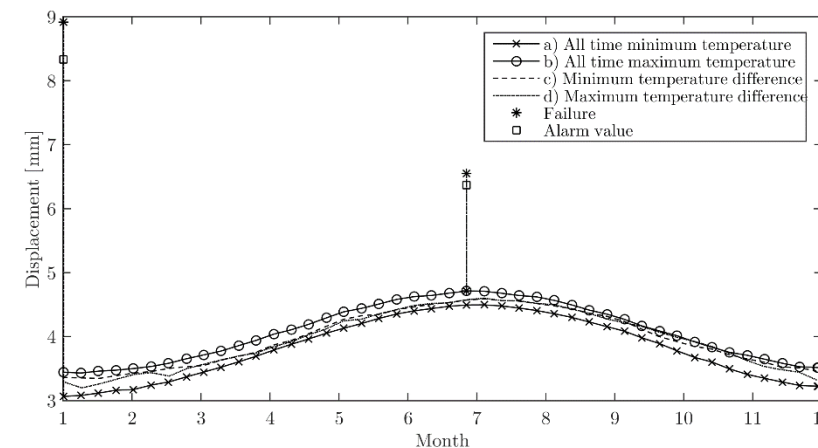
Calculations and analyses were made



Results were extracted



Results were analysed and conclusions were made



How has this work contributed to solve a problem related to energy?

Concrete buttress dams are used in the hydropower industry, and it is vital that they are functioning properly and do not fail, since it can cause loss of lives and income.

Monitoring dams is a great way to see that they are functioning properly, and analyses has to be made to find the limits of the dams movements.

The results from this project show that it is possible to calibrate a finite element model with sufficient accuracy in order for it to be used for predictions of the dams behavior, i.e. use it to design dam monitoring.