Finite element analysis of an arch dam, emphasizing on the modelling of boundary conditions and connections

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The goal for this thesis is to assess the importance of realistic modelling of boundary conditions and connections, when performing a nonlinear finite element analysis of a concrete dam. This is done by making four FE-models of the dam, where the models have an increasing compliance with the physical problem. The boundary conditions and connections effect on displacement-, crack-, and stress response are then studied. The displacement response were increased about 17 % from the most simplified to the most realistic model. The stress field and crack pattern varied locally near the connections, globally the effect were damped due to redistribution of forces allowed when using a nonlinear material model. The results showed that the most important modelling aspect is avoidance of all cohesion between dam and bedrock. Thus, a connected interface simulating no-slip-contact, or a real contact formulation, is preferred. Further, it is recommended that a list of criteria for realistic modelling are made based on the problem at hand, and the FE-model are checked for compliance with these.