Summary

In the exposition the deformation behaviour of an arch dam with mounted gravity dam in working condition has been analysed. The environmental actions and the structural response have been captured with various measurements for about three years. Due to the combination of measurements and FEM-simulation numerous thermal and mechanical material properties could be verified. Thus the temperature and deformation behaviour of any combination of actions can be tested. The pertinent effects of deformation behaviour are caused by the change in height of raised water and temperature. The water height causes immediate deformation of the concrete dam, while the ambient temperatures slowly change the temperature of the concrete dam and lead to a delayed deformation. This time-dependant thermal process is captured by using a transient heat flux model. The change of deformation caused by the change of concrete dam temperature and height of raised water were calculated by structural analysis. The FEM-models were set to the observed deformation behaviour by optimising the element mesh and the material properties in various courses of design optimization. Because of that the deformation has been assigned to the parts of deformation caused by change of dam temperature and change of height of raised water. Also the interaction between the two structural forms of concrete dam has been analysed and the effect of joint construction on the gravity dam has been verified. For the considered time period the temperature distribution of the structure depending on thermal load history has been numerically simulated as well as the mechanical deformation behaviour. The developed simulation tool supports the comprehension of each deformation effect and the interpretation of measurement and monitoring.