

INFILTRATION DYNAMICS AND HEAT TRANSPORT DURING SEEPAGE THROUGH EARTHEN DAMS

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In river engineering earthen dams and embankments represent geotechnical barriers to control the raise of the river water level. Depending on the specific design or the estate of the dam sealing, water will seep from the river-side through the foundation. Where not intercepted by a subsurface drain, the seepage will saturate the structure and finally emerge at the toe of the embankment. Saturation of the dam may alter soil mechanical properties resulting in slope instability. Further, if the seepage forces are large enough, soil will be eroded from the foundation which can lead to dam failure. Thus regular surveillance of dam seepage is required.

In order to inspect the potential of temperature measurements and infrared thermography as a method for surveillance of leaks in earthen dams, large scale experiments (14 x 3.5 x 8 m) of seepage through an homogenous dam were conducted. The recordings include the temporal and spatial distribution of pressure head and temperature as well as seepage dynamics under a variety of boundary conditions. These include lateral infiltration of the initially unsaturated earthen dam through leaks in the surface sealing at different locations.

The presentation will focus on the experimental set up and the numerical modelling (2D vertical plane) of transient saturated-unsaturated flow and heat transport during large scale experiments of dam seepage. Aspects of parameter estimation and model performance will be addressed. The use of numerical modelling for assessment of temperature monitoring as an instrument of leakage detection will be discussed.