Abstract

Borehole water-inflow tests allow measurement of discharges and water pressures in isolated sections of drains and piezometric boreholes. A series of water-inflow tests and water electrical conductivity analysis were carried out in an area of the foundation of an arch dam. Detailed three-dimensional numerical models developed for the analysis of the tests data in two foundation areas are presented. Results of rock mass permeability tests and areas where seepage paths cross each drain, identified with both water-inflow tests and water electrical conductivity analysis, were taken into account. Models were validated against flow rates and water pressures recorded *in situ*. By examining water-inflow tests using numerical models, the main flow processes are identified and quantified. Test results and conclusions drawn from the detailed 3D models were used to elaborate a global model of the foundation. The present study shows that borehole water-inflow tests add valuable information to the usual monitoring data, which improves our ability to analyse the behaviour of concrete dam foundations. It is also concluded that although discontinuum models provide a more natural representation of flow in jointed rock masses, equivalent continuum models can still be used successfully to study both global and local hydraulic behaviour of dam foundations.

Keywords: concrete dams, rock foundations, hydraulic behaviour, borehole water-inflow tests, numerical modelling

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