

Simulation of flow in fractured rocks using effective stress-dependent parameters and aquifer consolidation

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Abstract Effective stress plays an important role in aquifer dynamics, especially in those affected by high variations of water pressures. Increasing/decreasing effective stresses affect hydrogeological parameters, even in media of high stiffness, such as fractured rocks. This study presents a modelling approach of groundwater flow in fractured rocks and aquifer deformation taking into account the dependency of hydrogeological parameters on effective stress. This approach has been illustrated by modelling a fractured aquifer dynamic, the Zeuzier arch dam settlement. The calibrated model showed agreement with measured data. This simulation method could be used to study the sensitivity of aquifers to variations in effective stress due to water pressure.

Key words numerical modelling; effective stress; fracture permeability; fractured aquifers consolidation; Zeuzier