

The process of injecting chemical grout into cohesionless soil and its permeation by water are simulated by using a transparent soil model and a finite element model (FEM). The urea-formaldehyde resin is used as the grouting material in the transparent soil modelling. Two black and white charge-coupled device cameras are mounted in an orthogonal position to provide a three dimensional view of the groundwater-grout interface. The groundwater-grout interface is primarily influenced by the advection of the flowing water with increasing distance from the injection point owing to the reduction in the grouting pressure. An equation based on fluid dynamics in porous media and Darcy's law is then proposed to predict the displacement of the groundwater-grout interface in flowing water. A numerical model based on the FEM is also developed to simulate this process. The numerical simulation results are found to match the physical modelling well.