

The flow in porous media can be described by the Richards equation. However, porous media often exhibit a variety of heterogeneities, thus treating a porous medium as homogeneous does not often fit the reality well. Therefore, we describe the flow in the porous medium using the Richards equation with the dual-permeability model, which assumes that the porous medium can be separated into two different media. This thesis is concerned with the numerical solution of the Richards equation with the dual-permeability model. We present the derivation of the dual-permeability model, and for the numerical solution, we use the space-time discontinuous Galerkin method. This produces a system of nonlinear algebraic equations that need to be linearized. We perform a 1D experiment to verify the method and, finally, we present a 2D single-ring experiment to demonstrate the method.