

We consider the Brinkman model in geomechanics. We scale the equations so that they depend on one parameter t , lying in the range $0 \leq t \leq 1$. For the limit $t = 0$ we obtain Darcys equations, whereas $t = 1$ gives the Stokes problem. For t small, we have singular perturbation of Darcy. The problem is complicated since the solution spaces change; for Darcy the velocity is in L^2 and the pressure in H^1 , but for the Stokes problem it is the opposite. We develop a framework that takes this into account. Based on this we introduce and analyze three different finite element families:

- The family generalizing the MINI element for Stokes. For the pressure P_k elements ($k \geq 1$) are used and for the velocities the P_k elements are augmented with bubbles.
- Stabilized methods using equal order P_k element for all unknowns.
- The standard BDM and BDDF Darcy elements for which the nonconformity is avoided by using Nitsches method.

For all three families we derive a priori and a posteriori estimates and confirm them by numerical benchmark studies.