We consider the inverse coefficient problem of an initial-boundary value problem of a strongly degenerate parabolic equation modelling sedimentation-consolidation processes. We formulate the inverse problem as a minimization of a suitable cost function and we derive its formally gradient by means of two methods: an adjoint based formulation and a sensitivity calculus. The adjoint equation is a backward linear degenerate parabolic equation with discontinuous coefficients and the sensitivity equation is a forward linear strongly degenerate parabolic system with source term and discontinuous coefficients. A numerical method for the identification of parameters in the flux and diffusion functions of nonlinear strongly degenerate parabolic equations when the solution at a fixed time is known, is developed and tested. For the numerical approach, we assume that the direct problem is discretized by the Engquist-Osher scheme and obtain a numerical discrete adjoint and discrete first order perturbation associated to discrete sensitive system associated to this scheme. The gradient method with curvature information permits to find numerically the physical parameters.

References

