

Computation of seepage-induced erosion of soils by solving the Darcy-Brinkman equations

*Kazunori Fujisawa¹

1. Graduate School of Agriculture, Kyoto University

The numerical analysis of the soil erosion induced by seepage flows is presented. To the end, the following three aspects need to be computed: Water flow fields, onset and speed of erosion and boundary tracking between the soil and the water phases. The author employ the Darcy-Brinkman equations in order to compute the water flow fields around the soils, which easily enable the simultaneous analysis of the seepage flows in the porous media and the water flows in the fluid domain. The onset and the speed of the seepage-induced erosion is predicted by an empirical formula from the flow velocity and the pressure gradient of the seepage water. The boundary tracking scheme based on the phase-field equation is applied for tracking the soil boundary changing with the erosion. The numerical results have revealed that the combination of the above three aspects achieves the stable computation of the seepage erosion.

Keywords: Internal erosion, Numerical analysis