NUMERICAL ANALYSIS OF SEEPAGE-INDUCED EROSION BY THE DARCY-BRINKMAN EQUATIONS

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For the numerical analysis of soil erosion induced by seepage flows, the following three aspects are considered: Water flow fields, onset and speed of erosion and boundary tracking between the soil and the water phases. The Darcy-Brinkman equations are used for computing 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 show that the combination of the above three aspects achieves the physically realistic computation of the seepage erosion.

REFERENCES

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