Presentation title :A Numerical Study of Chemical Compatibility of GCLs

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Abstract .

A series of COMSOL numerical models were established to study the chemical compatibility of GCLs (geosynthetic clay liner). The effect of chemistry on the mesoscopic structure and the hydraulic conductivity of GCLs was investigated. The factors, including the initial mobile porosity, the swelling ratio, the pore size, and the ionic strength, were discussed as well. The mesoscopic mechanism of the physical and chemical processes of GCLs was explored by the COMSOL models. The hypothesis that the final mobile porosity and the final pore size are the key factors of the hydraulic conductivity of GCLs was proven by the simulation. Meanwhile, when the ionic strength increased from low to medium, the changes in pore size, mobile porosity, and hydraulic conductivity were obvious. However, when the ionic strength increased from medium to high, the changes of these parameters tended to be gentle, and the changes in hydraulic conductivity were not obvious. Moreover, a theoretical model considering the effect of the initial particle size, the initial mobile porosity, and the ionic strength was developed to predict the hydraulic conductivity of GCLs in a chemical solution. This theoretical model was verified by experimental data. A good agreement was obtained.

Biography

We seasoned researcher specializing in the numerical study of chemical compatibility of Geosynthetic Clay Liners (GCLs). With a fervent dedication to advancing environmental engineering, we developed a robust numerical model tailored to assess the chemical interactions within GCLs, paving the way for enhanced environmental protection measures. Drawing from extensive experience in research, numerical simulations, and academic instruction, we crafted this model to address critical challenges in geotechnical engineering. Our multidisciplinary background spans academia and industry, fostering a comprehensive understanding of the intricate dynamics at play in GCLs' chemical compatibility. Committed to pushing the boundaries of knowledge in her field, we innovative approach holds promise for optimizing the performance and longevity of GCLs, thereby contributing to sustainable environmental management practices.