

MGI032-03

Room:102

Time:May 23 17:00-17:15

Identification of hydraulic conductivity of groundwater flow simulation using a particle filter

Shinya Yamamoto^{1*}, Makoto Honda¹

¹Shimizu Corporation

In the groundwater flow simulation, the appropriate setting of the hydraulic parameters is essential for the reliable analysis. In fact, it is difficult to know the actual parameter values, because the available samples are insufficient, or the in-situ measurements are impossible in some cases. Additionally, there is often great difficulty in obtaining the simulation results that match the observed data, in which case many parameters must be determined in the analysis.

In this study, in order to determine the hydraulic parameters used in the groundwater analysis and improve model accuracy, we applied the particle filter, which is one of the sequential data assimilation methods, to the groundwater flow simulation from the perspective of using the observations.

For the validation, 2-dimensional saturated-unsaturated flow simulation of seepage through a rock-fill dam was performed as a test case. Observed data are the amount of the leakage, which are calculated from the forward analysis using the preset hydraulic conductivities. As a result of the sequential data assimilation, the hydraulic conductivities of the impervious zone and the dam-foundation could be estimated precisely, and we verified the effect of these parameters on the observed leakage with the posterior distributions of the state space variables.

In the maintenance management of dam, this technique can be applied to the damage identification of the impervious zone.

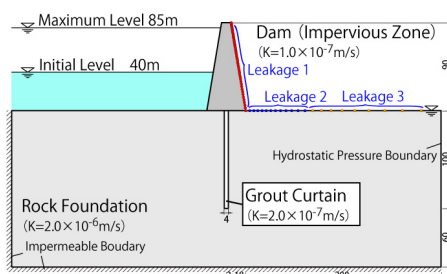


Fig1. Analytical model

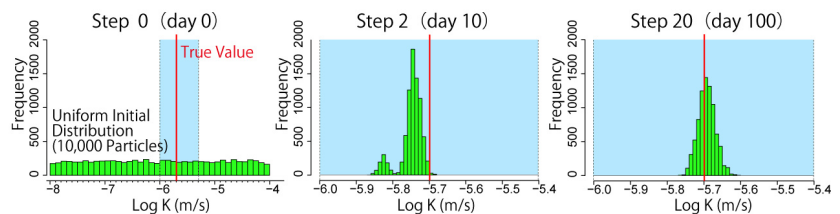


Fig2. Change of particle distribution of the hydraulic conductivity (rock foundation)

Keywords: data assimilation, particle filter, groundwater flow simulation