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Comparison of Numerical Model and Experiment for Seepage Through a Levee

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Seepage can be an important cause of failure in a levee, especially on a levee consisting of layered alluvium. Numerical models for seepage analysis are useful tools to analyze problems and design protection techniques relative to seepage through a levee, but each code has its limitations and warnings. Therefore pretest of the numerical model is the first mandatory step for a professional engineer, who is always responsible for the results. Especially, commercial models being used in general were not verified or calibrated the various problems for the applying. In addition, even though users do not understand seepage knowledge and take any technical training, they run the model and get the result. This paper investigates consideration and suitability of seepage numerical models through analytical solutions and experiments from a user's viewpoint. In case of a levee, because seepage phenomenon is changed according to water level and soil property, it is desirable that seepage analysis is applied to unsaturated-unsteady condition than saturated-steady condition. Also, suitable input conditions range of numerical model for seepage analysis was investigated. As investigation results, it was desirable that a grid size of numerical model was applied to smaller than 1/10 of levee height and a time step was set up less than 1 hour. Through an experiment of various scales, scale effect will be additionally analyzed. It was shown that this study may provide an insight in avoiding uncertainty and unnecessary risk from results of numerical models.