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ESTIMATING TIME STEPS FOR THE METHOD OF FINITE DIFFERENCES
BASED ON VERIFICATION OF THE WATER BALANCE

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Abstract

Two often used methods of averaging hydraulic conductivity, which is a parameter in the
differential form of Richards's equation with explicit linearisation, were analysed in the paper. Richards's equation was solved with the method of finite differences and the
coefficient of hydraulic conductivity was estimated using arithmetic and geometric mean. Based on checking water balance for the studied filtration area, time steps were selected and evaluated for the adopted spatial step.

Calculations revealed that the coefficient of hydraulic conductivity estimated acc. to the
relationship describing geometric mean allowed to obtain correct results (convergent and stable) for larger time steps in comparison with that based on algebraic mean. Computer simulation showed also that water balance was the more concordant the smaller time step we adopted for a given spatial step. The time step which provides the convergence and stability of calculation procedures may also guarantees the correct water balance. Therefore, a relationship has been elaborated to calculate the step in a way that water balance is not worse than the accuracy adopted for every step.