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# An efficient analytical model for horizontal infiltration in soils

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An efficient method for nonlinear approximate solution of the one-dimensional horizontal absorption equation is presented. The method pertains to a semi-infinite soil with uniform initial condition and constant soil water content at the beginning of a soil column. It does not make any prior assumptions about the form of the diffusivity function. The nonlinear solution is of simple combination of power and exponential functions and expresses in explicit form the distance as function of time and soil water content. It involves all the physical parameters and four additional fitting parameters which can be obtained by simple fitting procedure. Algebraic expressions that quantify the main infiltration process are derived from the basic equation. These include the sorptivity, the infiltration rate, the cumulative infiltration rate, and the wetting front. A comparison with exact, numerical and other analytical solutions validates the accuracy of the approximation and shows its advantage to other approximate solutions. The analytical expressions are used to predict experimental soil moisture profiles from simple

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