


Reply to “Comments on ‘Quasi-Analytical Solutions of the Soil Water Flow Equation for Problems of Evaporation’”

I thank Parlang e et al. for bringing to my attention their recent work, Lisle et al. (1987). What they refer to as Eq. [7] of Novak (1988) is actually the well-known mean, weighted diffusivity formula presented by Crank (1956, p. 256), who determined it from a numerical finite-difference solution to the problem. The quasi-analytical solutions presented in Novak (1988) depend upon judicious choice of the flux-concentration function \( F(\theta) \) for their accuracy. In Novak (1988) the best \( F(\theta) \), given by Eq. [38], was found by forcing agreement (for \( D'_t > 1000 \)) between the values of \( D'_t \) calculated using Eq. [11] and those given by Eq. [7], assumed to be “exact”. Since Crank only verified the accuracy of Eq. [7] (to within 1%) for \( D'_t < 200 \), some error is not surprising. With the new results of Lisle et al. (1987), a more accurate \( F(\theta) \) can be determined similarly, i.e.

\[
F(\theta) = \begin{cases} 
0.85 & \frac{\exp[\beta_{d}(1 - \Theta)] - \exp(\beta_{d}) + \beta_{d}\Theta}{1 - \exp(\beta_{d}) + \beta_{d}} + 0.15 
\end{cases} \quad [1]
\]

for \( \Theta > 0 \) and \( F(0) = 0 \). Comparison between the values of \( D'_t \) calculated using Eq. [11] of Novak (1988), with \( F(\theta) \) given by Eq. [1] above, and Lisle et al.'s numerical results are shown in Table 1. Since they agree to about 1%, using this \( F(\theta) \) in Eq. [9] of Novak (1988) yields a highly accurate solution to the semi-infinite constant-concentration desorption problem.

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References


Table 1. Comparison of \( \overline{D'}_t \) calculated using Eq. [11] of Novak (1988), with \( F(\theta) \) given by Eq. [1] above, and those from the numerical solution of Lisle et al. (1987), for selected values of \( D'_t \).

<table>
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<th>( D'_t )</th>
<th>Exact (Lisle)</th>
<th>Eq. [1] above</th>
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ERRATUM

Settling and Flocculation Value of Sodium-Montmorillonite Particles in Aqueous Media

R. KEREN, I. SHAINBERG, AND EVA KLEIN


The parenthesis sequence of Eq. [2] should read as follows:

\[
V_a(d) = \frac{64 nkT}{\chi} \left[ \tanh \left( \frac{Ze\Psi}{4kT} \right) \right]^2 e^{-2\chi d} \quad [2]
\]

Due to an unfortunate typographical error, the Erratum previously published in Soil Sci. Soc. Am. J. 53:315 was incorrect.