

## ***Interactive comment on “Numerical analysis of Richards’ problem for water penetration in unsaturated soils” by A. Barari et al.***

### **Anonymous Referee #2**

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In this paper, two analytical methods are demonstrated to solve a 1-D Richards equation. The techniques which are applied are not well explained, and it is unclear how it is applied to solve the Richards equation. Solutions are obtained, but it is unclear to exactly what problem the answers hold. There is no validation of the results (which could be against alternative analytical solutions or against numerical solutions for the same problem).

The techniques may be a worthwhile alternative for numerical schemes, but information lacks that demonstrates these benefits.

The theory behind the homotopy perturbation method and the variational iteration method is not well demonstrated, and there is hardly any reference to a decent the-

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oretical (i.e. mathematical) work that fully explains both techniques. From the text, it would be extremely difficult to repeat the exercise or apply these techniques to a practical problem. For instance, it is really unclear what the different cases ( $n = 1$  and  $n = 2$ ) physically mean. Furthermore, the method allows for generating negative  $z$  values, which cannot be explained from a physical point of view (just some vague reference to literature (without actually citing any!) is given).

Without going into a detailed discussion of minor remarks, I believe this paper, at this stage, cannot be accepted as the benefits of this methodology, which was not validated!, is not clear. Furthermore, from the paper, it is not obvious how to apply these methodologies to other problems (e.g. other boundary conditions, ...).

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 6359, 2009.

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