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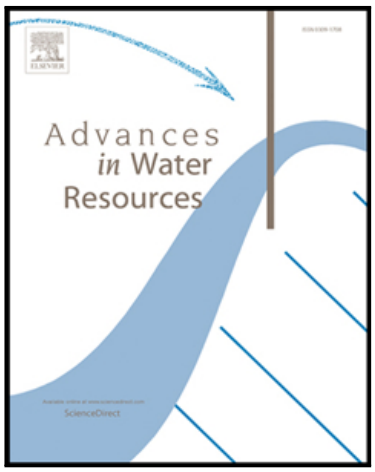

Second-order accurate finite volume schemes with the discrete maximum principle for solving Richards' equation on unstructured meshes

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Highlights

- We propose new second-order accurate nonlinear finite volume schemes for the head and pressure formulations of Richards' equation.
- We prove that the discrete maximum principles hold for both formulations at steady-state which mimics similar properties of the continuum solution.
- To the best of our knowledge, the resulting schemes are the first ones for this model which are the second-order accurate in the global L_2 norm on general polygonal meshes and preserve the DMP either for the hydraulic head or aqueous pressure.
- We studied the new preconditioning strategy for the nonlinear solvers applied for the nonlinear algebraic systems appeared in this method.

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