Unsaturated Flow and Solute Transport in a Repacked, Cross-bedded Sand. (S01-martel111556-Oral)

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Abstract:

This study was conducted to determine the effect of small-scale bedding structures on water flow and solute transport through sand. A Plexiglas box (1 x 0.5 x 0.23 m) was packed with a fine sand material in a cross-bedded formation. Water was applied at two unsaturated flow rates. Transient and steady-state readings of volumetric water content and soil water pressure head were used to develop a soil water retention curve (theta(psi)) for the layered sand. The resulting theta(psi) relationship was compared to the main wetting branch of another water retention curve for the same sand repacked homogeneously. A comparison of parameters obtained by curve fitting of the Gardner-Russo expression for theta(psi) to the two sets of water retention data indicates that while the pore size distributions of the two media are similar, the water entry pressure head is much higher in the cross-bedded sand. Spike inputs of KCl were applied to the cross-bedded sand. Solute breakthrough curves often exhibited earlier than expected breakthrough times and high degrees of tailing. These results suggest that small-scale cross bedding can induce a significant lateral component to flow under unsaturated conditions.

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