



DUAL-POROSITY AND KINEMATIC WAVE APPROACHES TO ASSESS THE DEGREE OF PREFERENTIAL FLOW IN AN UNSATURATED SOIL

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The purpose of this paper was to assess the degree of preferential flow in an unsaturated soil column using two different models: the dual-porosity model MACRO and the kinematic wave approach KWA based on boundary-layer flow theory. The soil column experiments consisted of six infiltrations with intensities varying from 15 to 101 mm h⁻¹. Bromide solution was also infiltrated at an intensity of 79 mm h⁻¹ and a concentration of 80 mg L⁻¹. Both MACRO and KWA indicated the absence of pure preferential flow. KWA indicated intermediate flow with dispersion of the wetting front with depth, whereas MACRO indicated flow dominated by the diffusion of capillary potential. These results shed light on the transition between flows dominated by momentum dissipation and by diffusion of capillary potential. The absence of pure macropore flow in the structured sandy soil is mainly due to efficient lateral mass exchange in this material.