



Rivulet approach to preferential infiltration in a soil column

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Preferential flow describes the fast movement of water. It is attributed to the rapid increase of volumetric soil moisture, θ , and capillary heads, h . The influence of preferential flow on transport of solutes and runoff generation is commonly accepted; however, it shows features of soil moisture dynamics that do not behave according to expectations (i.e. the domain of Richards' equation follows immediately the domain of Darcy's law when a soil dries out). We propose that the domain of rivulet flow is squeezed between the two classical domains of flow in porous media. Rivulets are tiny water streaks, which are gravity driven and are considered the basic units of preferential infiltration

Rivulet approach is applied to infiltration. Five sprinkler irrigation experiments with infiltration rates from 6.5 mm/h to 60 mm/h were carried out in a column of an undisturbed soil. TDR-probes and tensiometers measured water content and capillary heads. During infiltration, h in the soil column increased to atmospheric pressure. At some rates, it reacted faster than the increases of volumetric soil moisture and in other cases with high intensities, it reacted with the same rate.

Capillary heads, wetting front velocities, minimum water contents and the geometry of flow that characterize preferential flow will be discussed.