Biexponential Model for Infiltration

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Infiltration is a phenomenon which is caused by matric and gravitational forces. During the early stages of infiltration, this is the matric force which dominates over gravitational force. However, matric suction gradient gradually decreases, and gravitational force dominates. In this study, a biexponential model is presented for infiltration. This model is a modified form of Horton exponential equation and considers two domains for infiltration. It is assumed that the first domain represents the matric force and soil texture, and the second domain represents the gravitational force, soil structure, and macropores including final infiltration which is close to saturated hydraulic conductivity. To validate the biexponential model and compare it with the exponential model, 5 samples in which infiltration rate had been measured using double ring method were used. The results of direct fitting of measured infiltration rate to the biexponential and exponential models showed that the biexponential model is fitted better than the exponential model. The goodness of fit R^2 was obtained for the biexponential and exponential models in the range of 0.98 to 0.99, and 0.86 to 0.99, respectively. The results also indicated that the biexponential model is fitted better than the exponential model to the measured data in the initial and final infiltration rates.