



Spatial Variability Modeling of Field Infiltration Capacity

Aminul Islam, Akhtar Uz Zaman¹ and Dhrubajyoti Sen²

Department of Applied Engineering, Vignan's Foundation for Science, Technology and Research
Vadlamudi -522 213, India

¹School of Water Resources, ²Department of Civil Engineering, Indian Institute of Technology Kharagpur
Kharagpur-721 302, India
E-mail: aminul.ubkv@gmail.com

Abstract: Infiltration from rainfall is a major abstraction loss in the hydrological cycle that influences runoff generation and groundwater recharge processes. Accurate characterizing of infiltration is required to develop improved hydrological models. In this study the infiltration models were compared to estimate the infiltration behavior of IIT Kharagpur campus and their spatial variability presented. Infiltration test was performed at 12 different experimental sites with double ring infiltrometer. The infiltration data were fitted four commonly used infiltration models: Kostiakov (1932), Horton (1940), Philip (1957). The model performances were evaluated using three statistical criteria: coefficient of determination (R^2), root mean square error (RMSE). The spatial variability of infiltration in the study area was analyzed by using the coefficient of variation (CV) of model parameters and steady-state infiltration rates. The Philip's model performs best in estimating the infiltration behavior at study area followed by Kostiakov and Horton. However, Horton model estimates steady-state infiltration rate accurately than other models at maximum number of the experimental sites. The large spatial variability of model parameters and steady-state infiltration rate indicates the soil heterogeneity and non-Darcian flow pattern of water infiltration at IIT Kharagpur campus.

Keywords: Infiltration, Infiltration models, Comparison of infiltration models, Spatial variability
