



Transient Infiltration Analysis for Infinite Slopes using the Modified Function of Unsaturated Hydraulic Conductivity

Seboong Oh, Fauzi Achmad Zaky, and Young Mog Park

Yeungnam Univ., Dept. of Civil Engineering, Gyeongsan, Korea, Republic Of (sebungoh@yu.ac.kr)

The hydraulic behaviors in the soil layer are crucial to the transient infiltration analysis into natural slopes, in which unsaturated hydraulic conductivity (HC) can be evaluated theoretically from soil water retention curves (SWRC) by Mualem's equation. In the nonlinear infiltration analysis, the solution by some of smooth SWRCs is not converge for heavy rainfall condition, since the gradient of HCs is extremely steep near saturation. The van Genuchten's SWRC model has been modified near saturation and subsequently an analytical HC function was proposed to improve the van Genuchten-Mualem HC. Using the examples on 1-D infiltration analysis by the modified HC model, it is validated that any solutions can be converged for various rainfall conditions to keep numerical stability. Stability analysis based on unsaturated effective stress could simulate the infinite slope failure by the proposed HC model. The pore water pressure and the ratio of saturation increased from the surface to shallow depth ($\sim 1\text{m}$) and the factor of safety decreased gradually due to infiltration.

Acknowledgements This research is supported by grants from Korean NRF (2012M3A2A1050974 and 2015R1A2A2A01), which are greatly appreciated.