

Geomorphologic Nash Model with Variable Width Function

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Abstract

So far, geomorphologic dispersion due to the heterogeneity characteristics of flow paths in a basin has been demonstrated as a major factor affecting to the hydrologic response function of a catchment. This effect has considered by many previous studies taking into account flow path length factors, especially in the application of width function. Based upon the analysis of topographic index, another important geomorphologic factor extracted from DEM data, this work presents a new factor named saturation to evaluate its effects to the formation of the well-known instantaneous unit hydrograph (IUH) in Nash model and drainage structure in a river basin. First, the geomorphologic parameters corresponding to different saturation conditions are computed from DEM data with the support of GIS software. Then, in the combination of hydrologic and geomorphologic data, effective rainfall in each saturation degree and the Nash parameters are calculated using excel. Finally, the verification process with direct runoff data is conducted using Fortran programming. This process is applied to five sub-watersheds in Bocheong catchment (485.21 km²) in Korea where the necessary data are available and believable. The results from this approach will improve researchers and students' understandings about the relationship between rainfall and runoff and its relation with drainage structure within a catchment.

Keywords : Nash model, Width function, Topographic index, Saturation

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