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Z-Transform Based Instantaneous Unit Hydrograph for Hilly Watersheds

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ABSTRACT

Present study emphasizes the applicability of linear theory concept onto hilly watersheds. For this purpose, Z-transform technique was used to derive the instantaneous unit hydrograph (IUH) from the transfer function of autoregressive and moving average (ARMA) type linear difference equation. Parameters of the ARMA type rainfall-runoff process were estimated by least-squares method. The derived IUH from Z-transform (i.e. ARMA-IUH) has been used to compute the hydrologic response i.e. direct runoff hydrograph (DRH). Fur-ther, the superiority of the proposed approach has been tested by comparing the results through the results obtained from the Nash-IUH. Analyzing the results obtained from ARMA-IUH and Nash-IUH for the two hilly watersheds of North Western Himalayas shows the applicability of the linear theory concept even in turbulent flow conditions which are frequently encountered in hilly terrains under similar conditions of flow.

KEYWORDS

IUH, ARMA Process, Z-Transform, Nash Model, Direct Runoff Hydrograph, Hilly Watershed

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