Derivation of unit hydrograph by using rainfall and runoff data for a small watershed

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■ **ABSTRACT :** Runoff is the drainage of precipitation from a catchment, which flows out through its natural drainage system. After the occurrence of infiltration and other losses from the precipitation (rainfall), the excess rainfall flows out through the small natural channel on the land surface to the main drainage channel of the small watershed. A plot of the stream discharge against the elapsed time, gives the flow hydrograph. A hydrograph of the stream flow in the drainage channel of a small watershed, measured at its outlet, is the response of the watershed to its input of precipitation on a continuous basis, with respect to the time of occurrence of the storm but a unit hydrograph is the hydrograph of direct runoff resulting from one unit (generally 1 cm) of effective rainfall generated uniformly over the basin at a uniform rate during a specified period of time (Sherman, 1932). In black box analysis approach, little consideration is given initially to the conceptual characteristic of the unit hydrograph Inspite of mathematical and statistical techniques were employed to determine appropriate numeral values of unit hydrograph ordinates or co-efficient of a functional series representing the unit hydrograph. The derivative of a unit hydrograph from a simple hydrograph consists of dividing the ordinates of the direct runoff hydrograph results from the multiperiod storm. Unit hydrograph are derived from rainfall and stream flow records of complex flood hydrograph using techniques such as Collions iterative solution (Collions, 1939), system of progressive ordinates (Linseley *et al.,* 1958) and Fourier transformation (Levi and Valdas, 1964). In this study, Collions method is used for derivation of unit hydrograph from complex flood is utilized to derive the unit hydrograph from single-peaked runoff hydrograph of kothuwatari watershed (27.93 km^2) was chosen for the study. For the analysis of storm events of the above watershed of Sept. 18, 1991, Sept. 1991, Nov. 2-3, 1993, July 4, 1994, July 18, 1999, Sept. 15, 1996. August 23-24, 1994 was considered and found average percentage absolute deviation of the above storm events with respect to computed and observed flow volumes was 8.433 and 8.355, respectively. Here our study was confined to develop representative unit hydrograph for the kothuwatari watershed by the Collions method.

■ **KEY WORDS :** Unit hydrograph, Collions method, Precipitation effective rainfall, Iterative solution

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