



Applications of kinematic-wave based geomorphologic IUH model for rain floods prediction in Taiwan and Russia

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A kinematic-wave based geomorphologic instantaneous unit hydrograph (KW-GIUH) model developed by Lee and Yen (1997) was applied to perform the storm hydrograph simulations and predictions. The model is expected to reflect the influence of the watershed geomorphology, land cover condition, soil characteristics, and rainfall intensity. The nonlinearity of the rainfall-runoff process can be shown explicitly by a set of IUHs generated by the KW-GIUH model according to different rainfall inputs. Moreover, a systematic evaluation for the nonlinearity resulting from different watershed sizes can be addressed in the study.

A number of geomorphic factors are required to estimate the runoff travel times on overland areas and in channels, the travel times can be obtained from topographic maps or by the application of a digital elevation model (DEM; Lee, 1998). To simplify the field investigation work, Lee et al. (2007) proposed a variation for channel width and the channel roughness coefficient for different orders of streams.

The joint activity is carried out by group of Taiwan and Russian researchers in framework of project "Modeling dynamic river systems under extreme floods in different landscapes of monsoon climate zone". Preliminary results of the researches are presented here.

To demonstrate the capability of the KW-GIUH model for runoff simulation in different climate zone, hydrologic records from four watersheds, namely, Heng-Chi and

Wu-Tu watershed in the mountain region of Taiwan, and Centralny and Sadovy watershed in the south-eastern Primorye in Russia were used to validate the model. Taiwan lies within the subtropical region, with mean annual precipitation of about 2500 mm. The annual temperature ranges from an average of 29.7°C in summer to 13.3°C in winter in average in Taiwan. Typhoons and thunderstorms bring in abundant rainfall from May through September. Due to the uneven distribution both space and time, the amount of rainfall differs greatly from one season to another. Primorye, which is located on south-east border of Russia, lies within the monsoon climate zone typically. Mean annual precipitation range from about 1200 mm in mountains to 600 mm in plains. Typhoons influence weather from July through September. The temperature ranges from -10~-24.9°C during November and March, and 15.4~20.9°C for other months.

The order of the stream network for Heng-Chi, Wu-Tu, and Centralny watersheds are 4th order, and 5th order for the Sadovy watershed shown. The size of the Heng-Chi watershed is 53.15 km², the Wu-Tu watershed area is 203.87 km², the Centralny watershed area is 157.0 km² and the Sadovy watershed area is 395.0 km². Taiwanese watersheds are more elevated and more sloped than Russian ones. The hydrologic data of the study watersheds were adopted as applying to the KW-GIUH model for rainfall runoff simulations in different climate zone. The storm events were chosen as rainstorms or typhoons in Taiwan and rainy season during June - October in Russia. The results of simulations are good in the rising and recession hydrographs not only in Taiwan but also in Russia.