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A new approach in design flood estimation at hydrologic gauging stations

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The common practice by defining the theoretical design flood at the hydrologic gauging station is to establish a direct correlation between basic parameters of a hydrograph, i.e. peak and volume, for the same probability of occurrence (return periods). In this commonly used concept, it is assumed that the correlation coefficient of these two parameters of a hydrograph is equal to one. A shape of a hydrograph was determined by using the various theoretical curves, which described the increasing and decreasing phases, taking into account empirically determined relation between increasing and decreasing time. The major weakness of this concept is that the direct correlation between the basic parameters of a hydrograph, i.e. peak and volume, is not taken into account.

The practical experience of many countries showed that the correlation coefficient of these two basic parameters of a hydrograph is in a relatively wide range between 0 and 1, and that the basic assumption have therefore no verification.

A new approach in theoretical design flood at the hydrologic gauging stations assumes that the corresponded values of the two basic parameters of a hydrograph are defined by isolines of exceedance probabilities of two-dimensional random variables (Qmax; Wmaw).

The theoretically defined isolines of exceedance probabilities
$P\{(Qmax \geq qmax,P) \cap (Wmax \geq wmax, P)\} = P$

where:
Qmax – maximum hydrograph ordinate;
Wmax - maximum hydrograph volume;
P – exceedance probability

shall be detailed elaborated in the paper, as well as the way of selection of the most appropriate combination of two discussed flood wave parameters for calibrating the method for establishing the design flood.

The paper shall be illustrated with a practical example of defining theoretical flood wave probabilities of the Morava River at the hydrologic station of Ljubičevski most in Sebia.