

## **Defects in current methods of hydrological frequency calculation and proposals for improvement**

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**Abstract** The central problem of hydrological frequency calculation is to compute the design value according to a given design standard. The merits and demerits of frequency computation methods directly influence the reliability of the computed results, which in turn affect the safety of flood-control projects. Based on analysis of the evaluation standards of the method of hydrological frequency calculation, this paper identified the defects in the current method of hydrological frequency calculation, i.e. the safety of calculated design values is far less than the design standard, resulting in a hidden danger in flood-control projects. Starting from the concept of the expected failure probability (simply named expected probability) of the design object, a more reasonable evaluation standard for the method of hydrological frequency calculation was proposed, and using the concept of calculation frequency, a novel computational method of hydrological frequency was developed. For the P-III (Pearson Type III) distribution, the Monte-Carlo method was used to study the relationship between the design standard, expected probability, population distribution parameters and sample size,  $n$ . In addition, for this distribution the calculation frequencies corresponding to some design standard values were computed on the basis of the population parameters estimated by the curve-fitting method and moment method. It demonstrated that the accuracy of design values derived by calculation frequencies was greatly improved.

**Key words** calculation frequency; design standard; expected probability; hydrological frequency calculation

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