Cloud Transform Algorithm based Approach for Hydrological Series Frequency Analysis

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Abstract

Hydrological series frequency analysis is a fundamental task for water resources management and water conservancy project design. Given the deficiencies of higher distribution for the upper tail section of hydrological frequency curve and safer designing result of water conservancy project utilizing empirical frequency formula and Pearson-III type function based curve fitting method, the normal cloud transform algorithm based approach for hydrological series frequency analysis was proposed through estimating sample empirical frequency by normal cloud transform algorithm, and determining the cumulative probability distribution curve by overlapping calculation of multiple cloud distribution patterns. It can be revealed from its application result in norther Anhui province, China that, the varying trend of cumulative probability distribution curve of annual precipitation derived from the cloud transform algorithm based method was basically consistent with the result obtained through traditional empirical frequency formula. Meanwhile, the upper tail section of annual precipitation frequency curve derived from cloud transform algorithm was distributing below the calculation result utilizing traditional empirical frequency formula, which indicated that the annual precipitation frequency calculation result utilizing cloud transform algorithm was more optimal than the corresponding result obtained by traditional empirical frequency formula. Therefore, the proposed cloud transform algorithm based approach was reliable and effective for hydrological series frequency analysis, which can be further applied in the related research field of hydrological process analysis.

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