

Working Problems for BSE 5034 Stochastic Hydrology (2017)

WP-6 DDF and IDF

1. Annual maximum rainfalls (in mm) of various durations of the 竹子湖雨量站 are listed in the file BambooLake_AMS.csv. Assuming annual maximum rainfalls can be characterized by **log** Pearson type III distribution.
 - (1) Estimate distribution parameters by the method of L-moments.
 - (2) Plot the depth-duration-frequency (DDF) curve and the intensity-duration-frequency curve.
 - (3) Fit the IDF curve by using the following model:

$$i(tr, T) = \frac{aT^m}{(tr + b)^c}$$

A goodness-of-fit test on the above annual maximum data suggests that the 3-parameter log-normal, log-Pearson type III, Pearson type III, and Gumbel are possible candidate distributions.

- (1) Determine the best-fit distribution for the data by considering the Akaike information criterion (AIC) and the Bayesian information criterion (BIC).
- (2) For each of the four candidate distributions, estimate its distribution parameters by the method of L-moments and calculate the rainfall depths of 5, 20, 50, 100, and 200-year return periods.

[Note] For model selection, install the *nsRFA* package and use the function *MSClaio2008(x)*. For parameter estimation by the method of L-moments and quantile estimation, use the following functions in *lmom* package: *pelpe3*, *pelgum*, *pelln3*, *quape3*, *quagum*, and *qualn3*.