



Implementation of a software about the probability theory of reservoirs

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This study addresses the issue of “how calculating the overflow and deficit mean volume using a statistic model”. Many probabilistic studies have been performed to determine the overflow and deficit mean volume after introduction of probability theory of reservoirs by P.A.P. Moran (1954) and E.H. Lloyd (1963). The authors proposed several methods which respond to this question.

The limitations of the most of theories were the large calculus needed and little power of the computers to execute it. Another limitation was the use of annual sequence for inflow that reduced the precision. The software proposed offers a solution based on the modified Lloyd probability matrix method. This method has the advantage of handling statistic variables like mean value, standard deviation, ratio of correlation without reference to the sequence and is therefore particularly suitable for catchments with patchy data. In the model developed in this study the probability of failure and overflow are calculated on monthly basis.

The developed model uses also a bivariate probability distribution of net inflow (inflow volume minus demand volume) in two different time steps. The proposed software, with a friendly interface, represents a concrete application of stochastic theory of reservoir and it should be an interesting tool for technicians, associations, institutions and stakeholders.

References:

- Moran P.A.P., 1954. A probability theory of dams and storage system. Aust. J. Appl. Sci, 5.
- Lloyd E.H., 1963. A probability theory of reservoirs with serially correlated inputs.

J. of Hydr., 1.

- Cannarozzo, et al., 2004. Teoria stocastica dei serbatoi - studio a scala mensile. Atti della giornata di studio: Metodi statistici e matematici per l'analisi delle serie idrologiche.

- Cannarozzo, et al., 2004. Applicabilità della teoria stocastica dei serbatoi nei sistemi idrici complessi. Atti del XXIX Convegno Nazionale di Idraulica e Costruzioni Idrauliche.