REGIONALISATION OF FLOOD EXTREMES USING PATTERN ANALYSIS

BY

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Submitted in fulfillment of the requirement of the degree of

Doctor of Philosophy

to the

Indian Institute of Technology, Delhi

MAY 1998

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CERTIFICATE

This is to certify that the thesis titled, " **REGIONALISATION OF FLOOD EXTREMES USING PATTERN ANALYSIS** " being submitted by **Mr. AHMAD FAKHERI FARD**, 94RCE023 to the Indian Institute of Technology, Delhi, India, for the award of the degree of **DOCTOR OF PHILOSOPHY**, is a record of bonafide research work carried out by him under my supervision and guidance. The thesis work, in my opinion, has reached the standard, fulfilling the requirements for the said degree. The research report and the results presented in this thesis have not been submitted, in part or in full, to any other University or Institute, for the award of any degree or diploma.

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ACKNOWLEDGEMENTS

I am grateful and deeply indebted to my guide, Dr. B. P. Parida, Associate professor, Civil Engineering Department, I.I.T Delhi from whom I received systematic guidance, constant help and encouragement throughout the period of research program.

Sincere thanks to my parents Mr Hassan Fakheri Fard and Mrs T. Eskandar Zadeh the best advisers and supporters in my life.

I would like to record my especial heartful thanks to my wife Mrs F. Moosavi for her excellent cooperation and support during the entire period of this research and also to my littel son Sina who was a great companion for my wife.

Sincere thanks to my brother Mohmmad and my mother- in- low Mrs T. Ebrahimi for their best coorperation for my travelling to India.

I would like to express my gratefulness to the Government of Iran who awarded scholarship and financially supported me to do this research.

A.F.F.

Ahmad Fakheri Fard

Abstract

In search for homogeneous regions using pattern analysis, seven currently used hierarchical methods namely Single Linkage, Complete Linkage, Centroid, Median, Weighted Pair Group, Unweighted Pair Group, and Ward as well as non-hierarchical methods such as Forgy's K-mean algorithm as partitioning method and Q-mode Principal Component analysis (PCA), in both rotated and unrotated cases, have been attempted for classification of 88 flood sites situated in central and south-central India with basin characteristics and annual peak flood separately. Homogeneity of the resulted clusters from each method has been tested using S-statistics and appropriate discordant sites have been eliminated from the heterogeneous clusters to achieve perfect/moderate homogeneity. An economical scoring model has been developed using the number of clusters, number of members and the heterogeneity values of each cluster for arriving at the final choice of the regions. Regions identified by the unrotated principal component analysis (UR-PCA) method with the basin characteristics data was found to have the maximum score and as such has been considered as the most economical-fitted method for the study area. Based on the results Pearson Type Three (PTIII) was selected as the best-fitted distribution for study area from among several other choice and growth curves developed. Also a relation between mean annual peak flood($\bar{Q}_p$) and the basin characteristics data has been developed for of the each homogeneous region in order that transfer of information from gauged locations to ungauged ones can be undertaken through corresponding growth curves. These regions were further subjected to tests for internal homogeneity using H-statistics method and the underlying distributions were identified by Index Flood procedure using L-Moments.

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