

PROCEEDINGS
CONFERENCE
ENGINEERING
(ST) C
1978

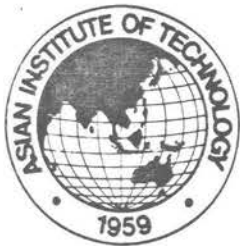


PROCEEDINGS OF

THE INTERNATIONAL CONFERENCE ON WATER RESOURCES ENGINEERING

HELD AT
ASIAN INSTITUTE OF TECHNOLOGY
BANGKOK, THAILAND
JANUARY 10-13, 1978

VOLUME I
FLUVIAL AND COASTAL HYDRAULICS



PROCEEDINGS
CONFERENCE
ENGINEERING
(S-1)
1978

PREFACE

Asia and the Pacific Regional Division of the International Association for Hydraulic Research was formed with the following objectives : to stimulate basic and applied research intended to increase the corpus of knowledge in the field of hydraulic engineering and water resources management; and to promote in Asia the professional competence of individuals engaged in these sciences and their application to the hydrosphere. This first International Conference is a significant step toward achieving these goals. The Conference is preceded by the Executive Committee meeting of the Asia and the Pacific Regional Division of IAHR and appropriately named as the First Congress of the Regional Division.

The problems concerning water resources engineering are regional as well as international in scope. It is important that regional characteristics be appropriately recognized in the design and operation of projects involving the control and efficient use of water resources. The Conference is aimed at helping countries in tackling actual problems associated with the fields covered.

The *Proceedings* consists of two volumes which correspond to the two parallel sessions of the Conference. Volume I contains 42 papers and Volume II is made of 38 papers. Papers contributed by authors from 24 countries are arranged in seven sessions in each Volume. The division into the seven sections is, in some cases, rather arbitrary since several papers could fit under more than one of the chosen subject headings. As far as possible these headings are made to correspond with the titles of the Conference sessions.

It has been found necessary to edit some of the papers to make them conform to the standards necessary for reproduction by a photo offset process. The editors hope that they might be forgiven for any mistakes that have arisen as a result, but they accept responsibility for any misrepresentations of the authors original manuscripts. Great care has been exercised in an attempt to avoid such mistakes.

The Organizers of the Conference wish to express their appreciation to the Technical Divisions of IAHR for reviewing the abstracts submitted and to the IAHR Secretariat for the encouragement and support. Sincere thanks are also due to the Administration of the Asian Institute of Technology. We are indebted to each and every one in the Division of Water Resources Engineering, and would like to mention in particular the helpful assistance of Miss K. Kunapemsiri, Mr. S.R. Coran, Mr. P.P.M. Castro and Mr. G.E. Amirthanathan in the preparation of the final manuscript.

S. SELVALINGAM
ANAT ARBHABHIRAMA

Asian Institute of Technology
Bangkok, Thailand

January, 1978

PROCEEDINGS
 CONFERENCE
 EROSION
 (ST)
 1972

TABLE OF CONTENTS
VOLUME I
FLUVIAL AND COASTAL HYDRAULICS
WATER QUALITY

A Numerical Model of Oxygen Conditions in a Two-Layered Marine Environment <i>Ole Krogh, K. I. Dahl-Madsen, E. Gargas and H. Schrøder</i>	3
A River Simulation Model for Predicting Water Quality and its Application to the Weber River Basin <i>W. J. Grenney, D. S. Bowles and J. P. Riley</i>	27
Alternative Policies for River Pollution Control by Reservoirs <i>J. M. Camboulives and M. Bonazountas</i>	45
Dead Zones on Longitudinal Dispersion in Natural Streams <i>T. H. Yoon</i>	69

EROSION AND SEDIMENTATION

Estimation of Extreme Troughs of Alluvial Bedforms <i>H. F. Cheong and H. W. Shen</i>	91
Design of Erodible Dams <i>S. P. Chee</i>	105
Studies on Erosion of Cohesive Soils <i>M. N. Rao</i>	115
Initiation of Motion in Sand Beds <i>K. Subramanya and T. Gangadharaiah</i>	135
Influence of Sedimentation Estimates on Reservoir Simulation Studies <i>Yin Au-Yeung</i>	145
Gravitational Convection of Solids in a Quiescent Fluid <i>T. Tingsanchali and N. L. Ackermann</i>	155
Concentration of Suspended Clay in Tidal Estuary <i>P. Thimakorn and A. D. Gupta</i>	173

SALINITY

Modelling of the Salinity Intrusion in the Sound between Denmark and Sweden <i>M. B. Abbott, H. Schrøder and I. R. Warren</i>	195
Numerical Salinity Intrusion Models <i>K. Fischer</i>	209
A Study of the Influence of River Discharge Regulation on the Salinity Equilibrium in the Estuary <i>C. Marche, T. T. Quach, P. Desroches and L. Aubin</i>	219
Convective Instability of Arbitrarily Stratified Water Layers <i>R. A. Kahawita</i>	233

ESTUARY HYDRAULICS

Use of an Estuary Mobile Bed Model to Investigate Natural Sedimentation Processes <i>Egon H. T. Giese</i>	243
Morphology of Rivers and Delta using Energy Method <i>H. H. Chang and J. C. Hill</i>	255
The Regimen of Takuapa Tidal Channel <i>S. Vongvisessomjai and R. Srikanthan</i>	277
Composite Mathematical Model of Saptamukhi River System including Outfall Channels for Studying the Effect of Closure <i>A. N. Basu</i>	297
Validity of Harmonic Approximation in Rectangular Channels subject to Co-oscillating Tides <i>E. Partheniades and P. Scarlatos</i>	315
The Harmonic Analysis of 25 Hours Tidal Current Observation <i>Wei-Ming Lin</i>	331
Basic Design to Pumped Storage Tidal Power Plant and its Applications <i>H. Kinno</i>	343

WAVE CHARACTERISTICS

On the Validities of Finite Amplitude Wave Theories <i>H. Nishimura and M. Isobe</i>	363
Spectral Growth of Waves to the Fully Arisen Sea <i>R. Silvester and S. Vongvisessomjai</i>	375
Diffusivity of Random Waves <i>N. Tamai and T. Nishimura</i>	395
Wave Diffraction at Harbour Entrances with Overlapping or Displaced Breakwaters <i>K. F. Daemrich and S. Kohlhasse</i>	413
Wave Reflection from a Fixed Horizontal Plate <i>M. Patarapanich</i>	427
Motion of a Circular Cylindrical Buoy in Water Waves <i>A. Watanabe and H. C. Le</i>	447

COASTAL STRUCTURES

Protection Against Storm Surges in a Tidal River <i>J. Sündermann, H. Vollmers and D. Berndt</i>	465
Experimental Verification of Theoretical Solutions for Wave Run-up on Irregular Beach Profiles <i>A. Fok, C. Marche, R. Saad and S. Vatagodakumbura</i>	477
Adequate Technology for Small Infrastructure Works in Coastal Regions <i>J. L. Mauricio Porraz and R. Ricardo Medina</i>	489
Field Verification of a Shoreline Simulation Model <i>T. Sasaki and H. Sakuramoto</i>	501

FLUVIAL HYDRAULICS

243	Solutions for Roll-Waves in Steep Rectangular Channels	521
	<i>J. Berlamont</i>	
255	Distribution of Velocity within a Shock Wave	535
	<i>P. G. Franke and W. Stählin</i>	
277	An Investigation of the Four-Point Operator in Two-Dimensional Long Wave Modelling	547
	<i>G. D. Tong</i>	
297	Flood Simulation Model of the Arno River	565
	<i>U. Maione and F. Greco</i>	
315	On the Deformation of Floods due to Bottle-Neck Valleys	583
	<i>M. Kawanishi and N. Tamai</i>	
331	Effects of Interaction on a Channel with One Flood-Plain	597
	<i>E. M. Elsayy and P. M. Crory</i>	
343	Sediment Discharge and River Patterns	609
	<i>H. R. Khan</i>	
363	Some Aspects on the Meandering of the Kiwira River, Tanzania	625
	<i>P. S. Baweja and S. V. K. Sarma</i>	
375	Effect of Increase in Sediment Load on Roughness Coefficient in Unsteady Flow	649
	<i>J. P. Soni</i>	
395	On the Hydraulic Modelling of the Mekong River at Quatre Bras	661
	<i>H. Shi-Igai and A. Azam</i>	
413	Author Index	685

VOLUME II

WATER RESOURCES DEVELOPMENT AND MANAGEMENT

HYDROLOGIC SIMULATION

427	Hydrologic Flood Routing in Confluence Reaches	689
	<i>S. J. Prohaska</i>	
447	Mathematical Modelling of Watershed Runoff	703
	<i>V. P. Singh</i>	
465	Results of the Preliminary Phase of the Chao Phraya and Meklong River Basin Study in Thailand	727
	<i>J. E. Cowley and D. Jaraswathana</i>	
477	Rainfall Runoff Relationship of the Upper Chao Phya River Basin	749
	<i>T. Tingsanchali and A. Arbhahirama</i>	

WATER SUPPLY

501	Residential Water Conservation in the United States	771
	<i>M. A. Milne</i>	

Optimal Flow Allocation Method for Design of Least Cost Water Distribution Works	785
<i>R. N. Bhattacharyya and N. Chaudhuri</i>	
Economic Staging of a Multipurpose Water Supply System	805
<i>F. Szidarovszky, I. Bogardi and L. Duckstein</i>	
Water Resources Evaluation of Lake Hertel for Suburban Montreal, P. Q., Canada	829
<i>S. R. Goswami</i>	
The Potability of Urban Water Supplies	853
<i>B. Henderson – Sellers</i>	
Cleaning of Water Supply Systems using Pneumatic Scavenging	865
<i>A. Kleinschroth and P. G. Franke</i>	
Flow towards a Well in Bounded Leaky Artesian Aquifers	873
<i>M. H. Abdul Khader and D. Ramadurgaiah</i>	
Mathematical Models for Flow of Fresh Water in Coastal Aquifers	889
<i>B. M. Sahni and H. B. S. Seth</i>	

CATCHMENT HYDROLOGY

Runoff Analysis of Khuae Yai River	915
<i>M. Hino and K. Sunada</i>	
Use of Topographic Information in Modelling Watershed Runoff Response	923
<i>V. P. Singh and K. L. Shelburne</i>	
A Linear Distributed Hydrologic Model for a Natural Catchment	949
<i>B. S. Mathur, M. K. Vasantha and L. Rangaswamappa</i>	

WATER RESOURCES MANAGEMENT

Managing United States Floods	963
<i>B. Buehler</i>	
Water Resources Management in India in 1990's	981
<i>A. C. Chaturvedi</i>	
Environmental Management for Inner Gulf of Thailand	1001
<i>H. F. Ludwig and C. Tongkasame</i>	
Irrigation and Water Resources in Sudan	1025
<i>A. M. A. Salih</i>	
Water Management Policy in Developing Countries: Analysis of Some Non-Engineering Factors-A Case Study of India	1041
<i>S. Gautam</i>	
A Simulation Model for Water Resources Development Planning in the Sebou River Basin in Morocco	1057
<i>M. Sbihi, R. A. Buning and H. K. A. Rotermundt</i>	

785	Planning the Exploration for Water Resources in an Arid/Semi Arid Area	1071
	<i>R. H. J. Sellin and B. P. J. Williams</i>	
805	Development of an Optimal Cropping Pattern for Command Area of Upper Ganga Canal System in Uttar Pradesh, India	1093
829	<i>R. S. Saksena and Satish Chandra</i>	
853	Highlights of Planning and Design Parameters on Conversion from Run of the River to Reservoir Irrigation: Mahanadi Reservoir Project, Madhya Pradesh – India	1113
	<i>D. R. Sikka</i>	
865	NUMERICAL HYDRAULICS	
873	On Applications of Numerical Hydraulic Modelling Methods in Water Resources Engineering	1127
	<i>M. B. Abbott</i>	
889	A Computer Program for Water Network Analysis	1135
	<i>R. Gay and K. K. Chin</i>	
	A Computer technique for Optimal Water Network Design	1157
	<i>K. K. Chin, R. Gay, S. B. Khoo, K. P. Ong and C. K. Swee</i>	
915	A Comparison between Experimental and Numerical Investigations of the Motion of the Water Surface in a Model Surge Tank	1177
	<i>P. W. France</i>	
923	STOCHASTIC HYDROLOGY	
949	Inadequacy of Hydrology Records in Reservoir Design	1189
	<i>Z. Sen</i>	
	Synthesis of Storm Rainfall Sequences	1203
	<i>S. M. Seth and P. Sathyanath</i>	
963	Hydrological Prediction Engineering	1211
	<i>P. Kumaraswamy</i>	
981	RESERVOIR OPERATION	
1001	A Real Time Optimization Model for Reservoir Operation	1227
	<i>William W-G. Yeh</i>	
1025	Sequential Decisions in the Operation of a Hydro-Power System	1239
	<i>C. Natarajan and B. B. Sharma</i>	
1041	Co-operation and On-Line Flood Control of Large Scale Reservoir Systems	1251
	<i>M. A. Bonazountas</i>	
1057	Development of Operating Rule Curve for Flood Control of the Pa Mong Project	1267
	<i>N. Kang</i>	

Operation of Meklong Basin Reservoirs system, Thailand	1289
<i>S. Selvalingam and S. Phongrapaphan</i>	
Diversion and Filling of Reservoir during Construction of Ban Chao Nen Dam	1309
<i>M. L. C. Kridakorn and R. Sittipod</i>	
Operation of Chambal Water Resources System	1325
<i>V. M. Chitale</i>	
Author Index	1345