

Proceedings of

**THIRD INTERNATIONAL
WORKSHOP
ON
ALLUVIAL RIVER PROBLEMS
(TIWARP)**



in honour of
PROF. R.J. GARDE



**UNIVERSITY OF ROORKEE
ROORKEE (U.P.), INDIA
March 2-4, 1989**



A.A. BALKEMA/ ROTTERDAM/ 1989



CONTENTS

<i>Preface</i>	vii
<i>About Professor R.J. Garde</i>	ix
INAUGURAL LECTURE	
Research Needs in Fluvial Hydraulics <i>R.J. Garde</i>	3
SESSION 1 : SCOUR AND ITS PROTECTION	
Vorticity Characteristics of Scouring Horseshoe Vortex <i>M. Muzzammil, Kailash Gupta, T. Gangadharaiah and K. Subramanya</i>	19
Scour Estimation and Protection for Road Bridge Across Tapi River Near Idgaon, Maharashtra <i>M.L. Godbole and P.B. Mehendale</i>	27
Estimation of Equilibrium Scour Depth Around Circular Bridge Piers <i>U.C. Kothiyari, R.J. Garde and K. G. Ranga Raju</i>	39
SESSION 2: MORPHOLOGICAL CALCULATIONS	
Distinction between Armor and Pavement (<i>Invited</i>) <i>S.C. Jain</i>	49
Philosophy of Morpho-Predictions in Alluvial Channels—Case Study <i>A.N. Biswas and A.K. Chatterjee</i>	55
Modelling of Armouring Process in Alluvial Streams <i>A.B. Palaniappan and P.N. Godbole</i>	63
Evaluation of Friction Factor in Aggrading and Degrading Alluvial Channels <i>Neeraj Kumar and J.P. Soni</i>	73
SESSION 3: RESISTANCE OF ALLUVIAL STREAMS	
Computation of Small Scale River Morphology and Stage-Discharge Curves in Alluvial Rivers (<i>Invited</i>) <i>Jorgen Fredsoe</i>	83
Correction for Wall Shear <i>Kandula V.N. Sarma and B.V. Ramana Prasad</i>	95

Form Resistance of Rippled Beds—A Verification Study <i>Nandana Vittal</i>	101
Dimensions of Bed Undulations in Alluvial Channels <i>Anupma Sharma, R.J. Garde and C. Mohan</i>	111
Dynamics of Flow Over Dunes <i>Enio Paris</i>	119

SESSION 4 : SEDIMENT TRANSPORT

Sediment Transport in Rigid Bed Channels <i>C. Nalluri and R. Mayerle</i>	129
Effect of Non-Uniformity of Bed Material on Sediment Transport <i>M.K. Mittal, P.D. Porey, R.J. Garde and K.G. Ranga Raju</i>	137
Some Aspects of Sediment Transport in Non-Equilibrium Streams <i>G.L. Asawa and K.G. Ranga Raju</i>	147
A New Incipient Motion Criterion Independent of Particle Size <i>A. Rama Krishna Rao</i>	155

SESSION 5 : SEDIMENT YIELD AND CONTROL

Safety of a Reservoir Subject to Sedimentation (<i>Invited</i>) <i>Erich J. Plate</i>	163
Unsteady Flow Simulation in Karkheh River and Reservoirs System <i>C. Fouladi and R.J. Shokoh</i>	175
Modelling Sediment Production Rate of Watersheds <i>Jose C. Samuel and Ranvir Singh</i>	187
Sedimentation of Reservoirs in U.P. <i>D.N. Bhargava, C.K. Agrawal, S.S. Tiagi and R.S. Verma</i>	197
Seismosediments in Bhakra Catchment Area <i>Arun Bapat</i>	209

SESSION 6 : RIVER IMPROVEMENT WORKS

Secondary Current Measurements in a Meandering Gravel-Bed River (<i>Invited</i>) <i>Colin R. Thorne, Andrew J. Markham and Joyce Oldfield</i>	219
Performance of Piles for River Training—A Laboratory Study <i>N.A. Kakroo, P.N. Kapoor and R.L. Misri</i>	231
Erratic Meander Shift of the River Ganga at Kanpur <i>M. Hegde, V.K. Mathur and P.S. Mandal</i>	239
On the Length and Spacing of Spurs <i>D.M. Kondap and J.D. Prayag</i>	247
Flow Around Slotted Spurs <i>K. Subramanya and T. Gangadharaiah</i>	255
Remedial Measures to Prevent Silting Near Intake Wells in Kuradih River at Barsua—A Case Study Using Distorted Model <i>H.S. Nagabhushanaiah</i>	265

SESSION 7 : COASTAL SEDIMENTATION AND ESTUARINE HYDRAULICS

Sediment Transport in a Tidal River—Numerical Model Study	279
<i>A.K. Chatterjee and K. Chakrabarty</i>	

SESSION 8 : SEDIMENT MEASUREMENT

A Micro-Computer Based Experimental Set-Up for Sediment-Size-Analysis	289
<i>Amit Chaudhuri and Chandan Mazumdar</i>	
Surface Texture Effect on the Fall Velocity of Regular Geometric Particles	299
<i>Ashok Kumar and A.K. Shrangarya</i>	
Horizontal Sediment Laden Flows Through Bends	311
<i>Baljeet S. Kapoor and Choka Ram Garg</i>	
Appendices	321
Index of Contributors	331