

1. River fundamentals

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1.1 1.1.1 Fluid mechanics - Open channel flow A

1. Spatial averaging over a variable volume and its implications for simulation of open channel flows over permeable beds, *Abdulrauf Bello, Dubravka Pokrajac.*
2. Modeling turbulent stream flows over rough permeable beds, *Gauthier Rousseau, Christophe Ancey.*
3. Double-averaged momentum and energy budgets for open-channel flows over self-affine bed roughness, *Stuart Cameron, Vladimir Nikora, Mark Stewart.*
4. Three-dimensional flow structures of straight rough-bed channels with different aspect ratios, *Yuya Takakuwa, Shoji FUKUOKA.*
5. Effect of free surface perturbation on mean and turbulence characteristics in a smooth open channel flow, *Subhadip Das, Ram Balachandar, Vesselina Roussinova, Ronald Barron.*
6. Wave and Bed-friction Effect on Instability of Shear Flow in Shallow Waters, *Vinncent Chu, Boyuan Yu.*
7. Effect of horizontal confinement on developing flow over a rough porous bed, *Priscilla Williams, Vesselina Roussinova, Ram Balachandar, Ronald Barron.*

1.2 1.1.2 Fluid mechanics - Open channel flow B

1. Secondary currents in smooth-wall open channel flow, *Mohammadreza Khanarmuei, Yulia Akutina, Victor Dupuis, Olivier Eiff, Kabir Suara, Richard Brown.*
2. Predicting the vortex shedding frequency at an open-channel lateral cavity, *Emmanuel Mignot, Clement Perrot-Minot, Nicolas Rivière, Diego Lopez.*
3. Emergence of Kelvin-Helmholtz instabilities in shallow mixing layers: An experimental study, *Sébastien PROUST, Céline Berni, Vladimir Nikora.*
4. Modelling of the apparent shear stress for predicting zonal discharge in rough and smooth asymmetric compound open channels, *Mr. Prateek Kumar Singh, Dr. Xiaonan Tang.*
5. Apparent shear in compound channels with non-uniform flow, *Kamalini DEVI, Bhabani Shankar DAS, Jnana Ranjan KHUNTIA, Kishanjit Kumar KHATUA.*
6. Flow in river bends: 3D and 2D modelling, *Victor Chavarrias, Ap van Dongeren, Herman Kernkamp, Willem Ottevanger, Mohamed Yossef.*
7. Hydrodynamics of Sinuous Channel with Seepage, *Jyotismita Taye, Gerardo Caroppi, Paola Gualtieri, Bimlesh Kumar.*

1.3 1.1.3 Fluid mechanics - Layered flows

1. Density Driven Mixing Layer in Environmental Flows: A high-resolution remote sensing image based, numerical simulation and field measurements aided confluence mixing model, *Dongchen Wang, Marcelo H. Garcia.*
2. Entrainment in lock-release gravity currents propagating up a slope, *Maria Chiara De Falco, Luisa Ottolenghi, Claudia Adduce.*
3. Lagrangian simulation of water chute disaggregation, *Athanasios Mokus, Damien Violeau, Thomas Fonty, Yvan Bercovitz.*
4. Understanding inertial particle effects on turbulence-particle interactions in dilute suspensions using two-phase flow Large Eddy Simulations, *Antoine MATHIEU, Julien CHAUCHAT, Cyrille BONAMY, Guillaume BALARAC, Tian-Jian HSU.*

1.4 1.1.4 Fluid mechanics - Flow around obstacles

1. A first simulation of a model aquatic canopy at high Cauchy number, *Bastian Löhner, Jochen Fröhlich, Doppler Delphine, Sara Puijalon, Nicolas Rivière, J. John Soundar Jerome.*
2. Velocity field in a single row canopy made of flexible blades for a static reconfiguration case and a monami case, *Bastian Löhner, J. John Soundar Jerome, Sylvie Barsu, Nicolas Rivière, Doppler Delphine, Jochen Fröhlich.*
3. Separation Flow Characteristics Upstream of Finite Crest Length Weir with a Downstream Ramp, *JooYoung Bang, Il Won Seo, Byeong Uk Kim.*
4. Turbulence structures in flows over a submerged weir, *Chaewoong Ban, Sung-Uk Choi.*
5. Flow structures around laterally and vertically hybrid spur dike, *Akihiro Tominaga, Obaidullah Safie, Hiroki Komura.*
6. Experimental Analysis of Turbulent Open Channel Flow in the Near-Wake Region of a Surface-Mounted Horizontal Circular Cylinder, *Kalpna Devi, Prashanth Reddy Hanmaiahgari.*
7. Flow characteristics around pile-group groynes with different arrangements of piles, *Obaidullah Safie, Akihiro Tominaga.*

1.5 1.2.1 Sediment transport - Particle motion

1. Particle motion and sediment transport over bedforms, *Renske Terwisscha van Scheltinga, Heide Friedrich, Giovanni Coco.*
2. Turbulent sediment transport processes in energetic sediment-laden open-channel flows, *Helder Guta, David Hurther, Julien Chauchat.*
3. Using instrumented particles to assess the dynamics of sediment transport for above threshold of motion turbulent flows, *Zaid AL-Husban, Manouosos Valyrakis.*
4. Lagrangian statistics of bed-load particle transport from experiments with a long measurement domain, *Francesco Ballio, Seyed Abbas Hosseini Sadabadi, Alessio Radice, Sankar Sarkar, Guido Simeone, Amir Reza Zarrati.*
5. Effects of sediment influx on sediment transport characteristics in a river channel, *Saba Rabab, Michael Gormley, Lindsay Beavers.*
6. Effect of the shape of a sediment particle on its jump, *Ramandeep Jain, Silvio Tschisgale, Jochen Fröhlich.*

1.6 1.2.2 Sediment transport - Near-bed transport

1. Experimental investigation of the morpho- and hydrodynamics of fine sediment erosion over a fixed coarse-grain bed, *Michele Trevisson, Olivier Eiff, Yulia Akutina.*
2. A new 2D bedload transport model based on non-capacity approach to overcome the problems associated to finite-depth sediment layers, *Sergio Martínez-Aranda, Javier Murillo, Pilar García-Navarro.*
3. Modelling of massive bedload deposition in a debris basin: cross comparison between numerical and small scale modelling, *Matthieu Gonzales de Linares, Vincent Mano, Guillaume Piton, Alain Recking.*
4. Sediment transport potential in a channelized floodplain, *FNU Sumaiya, John T. Schubert, Muneer Ahammad, Jonathan A. Czuba, Scott R. David, Graham H. Johnston, Douglas A. Edmonds.*

5. Effects of irregular particle shapes on the sediment movement and transport rate in gravel-bed channels, *Takatoshi ATSUMI, Shoji FUKUOKA*.
6. Combined load in open channel: modelling of transport layer at high bed shear, *Vaclav Matousek, Stepan Zrostlik*.

1.7 1.2.3 Sediment transport - Applications A

1. A numerical investigation on sediment erosion in confluence channel with erodible and non-erodible banks, *Qingyuan YANG, Mingfu GUAN, Jingjing ZHAI, Xiekang WANG*.
2. Anchor-ice rafting, an important mechanism for bed-sediment transport in cold-regions rivers, *Edward Kempema, Robert Ettema, Kristin Bunte*.
3. Numerical modeling of flow and sediment transport in a real shallow reservoir: comparison between 2D and 3D simulation, *Matthieu Secher, Nicolas Claude, Eric Valette, Marion Duclercq, Junjian Deng*.
4. Experiments to assess the efficacy of sediment flushing in reservoirs, *Sebastián Guillén-Ludeña, Jorge A. Toapaxi, Jose M. Carrillo, Luis G. Castillo*.
5. Reservoir sedimentation management with upstream sediment remanipulated, *Tingyu Li, Gregory Pasternack*.
6. Numerical Analysis of Bed Development during Pressure Flushing with Partial Drawdown, *Maximilian Kunz, Kilian Mouris, SanatK Karmacharya, Nils Rütther, Stefan Haun*.
7. Numerical modelling of sediment deposition in Lake Mills, USA, *Nils Reidar B. Olsen*.

1.8 1.2.4 Sediment transport - Applications B

1. The growth process of river dunes, *Suleyman Naqshband, Ton Hoitink*.
2. Hydrac, an inversion software for SPM quantification, *Guillaume Fromant, David Hurther, Nicolas Le Dantec, Anne Lebourges-Dhaussy, Frédéric Jourdin, Adrien Vergnes, Jérôme Le Coz, Stéphane Fischer, Gilles Pierrefeu*.
3. Tracking the mean annual velocity and vertical mixing of bedload tracers, *Bruce MacVicar, Aryn Cain, Matt Iannetta, Chris Muirhead, Elli Papangelakis, Thomas Raso, Peter Ashmore*.
4. Fluvial erosion of glacial till and clay deposits: sampling methods, *Susan Gaskin, Liliane Gonthier, Dorothy Yeats*.
5. Bed-material transport over entrance sills at longitudinal training walls, *Annemarie van Os, Erik Mosselman, Lieke Lokin, Wim Uijttewaal, Robert Jan Labeur, Ana Luisa Osorio*.
6. Measurement of sand transport with a submerged pump: presentation of the results of a test campaign carried out on the Isère River in July 2019, *Alain Recking, Sebastien Zanker, François Lauters, Thomas Geay, Benoît Camenen, Laurent Brunet, Firmin Fontaine, maxence Regazzoni*.
7. Incipient motion of gravel-boulder sediment particles in rivers of Costa Rica, *Rafael Murillo Muñoz, Lucrecia Alvarez*.

1.9 1.3.1 Morphodynamics - Bed forms

1. Effect of bank roughness on step-pool systems in steep channels, *Fiona Maager, Benjamin Hohermuth, Volker Weitbrecht, Robert M. Boes.*
2. Field investigation of bedforms and flow resistance in a large sand river, *Leonardo Schippa.*
3. Aspects of the formation of dunes in gravel streams, *Kenneth Lockwood, Ana Maria Ferreira da Silva.*
4. A specific energy diagram for antidunes, *Francisco Núñez-González, Juan Pedro Martin-Vide, Nils Reidar B. Olsen.*
5. Superimposed bedforms in the Rhine-Meuse delta, *Judith Poelman, Ton Hoitink, Suleyman Naqshband.*
6. Numerical simulation of dune movements during a flood event in River Elbe, Germany, *Rebekka Kopmann.*
7. Influence of bed forms on stage discharge relations in compound channels, *Till Branß, Jochen Aberle, Francisco Núñez-González.*

1.10 1.3.2 Morphodynamics - Bed evolution

1. River bed variation of Chongqing reach in upstream of the Three Gorges Reservoir, *Chunjing Liu, Jing Lu, Leilei Gu, Fei Liu.*
2. Bed level change in the Upper Rhine Delta and Niederrhein, *Clàudia Ylla Arbós, Astrid Blom, Saskia van Vuren, Ralph M.J. Schielen, Fernando Acevedo Goldaracena.*
3. Channel evolution and bank erosion in the Middle Yangtze River after the TGP operation, *Junqiang Xia, Meirong Zhou, Shanshan Deng, Quanxi Xu.*
4. Comparing 2-D and 1-D/2-D modelling of Agly River bed change during a flood, *André Paquier, Mahmoud HASBAIA, Salheddine Mezbatche.*
5. An estuary out of equilibrium: the importance of dredging in determining the net sediment flux in the Rhine-Meuse Estuary, *Jana Cox, Ymkje Huismans, Maarten Kleinhans.*

1.11 1.3.3 Morphodynamics - Meanders and bars

1. Changes in braided river morphology resulting from a flood sequence, *Rocio Luz Fernandez, Anne Baar, Daniel Parsons, Stuart McLelland, Bas Bodewes.*
2. Upstream channel degradation triggered by a meander cutoff: potential replacement for channel dredging, *Kensuke Naito, Leo Guerrero, Henry Valverde, Yulissa Estrada, Flor Fuentes, Bryan Santillan, Grecia Valvidia, Jorge D. Abad.*
3. Modeling the planform development of confined meandering rivers, *Hossein Amini, Simone Zen, Federico Monegaglia, Stefano Lanzoni, Marco Tubino, Guido Zolezzi.*
4. 2D numerical modeling on meander chute cutoffs, *Zhi Li, Marcelo H. Garcia.*
5. Numerical Simulation Study of A Bend-Cut Resolution to Flood Control at Fu River tail, Poyang Lake of China, *Hua Ge, Lingling Zhu.*
6. Effect of flow unsteadiness on the long-term evolution of alternate bars, *Mattia Carlin, Marco Redolfi, Marco Tubino.*

1.12 1.3.4 Morphodynamics - River cross section

1. Effect of alternate expansion and contraction of width on the river morphology, *Dwarikanath Ratha, TAPAS KARMAKER.*
2. Bed morphology evolution and 3D-flow field characterization at a lateral water intake, *Joana Baltazar, Elsa Alves, António Cardoso, Gokcen Bombar.*
3. An experimental study on the overbank sedimentation in an asymmetrical compound channel, *Carmelo Juez, Christine Schaerer, Hannes Jenny, Anton Schleiss, Mario Franca.*
4. Channel-floodplain response to changes in sediment supply and floodplain width, *Enrica Viparelli, Esther Eke.*
5. Optimal conditions for floodplain sedimentation and land aggradation in river deltas, *Jaap Nienhuis, Harm Jan Pierik, Wouter Gerarts.*
6. Breaching of fluvial dykes: influence of the dyke geometry, *Vincent Schmitz, Sébastien Erpicum, Ismail Rifai, Kamal EL KADI ABDERREZZAK, Pierre Archambeau, Michel Piroton, Benjamin DEWALS.*

1.13 1.3.5 Morphodynamics - Bank stability

1. On the equilibrium width of rivers with cohesive erodible banks, *Simona Francalanci, Stefano Lanzoni, Luca Solari.*
2. Assessing the effect of groynes orientation on near-bank flow and morphology in a natural meander bend using 2D numerical simulation, *Saroj Karki, Hajime Nakagawa, Kenji Kawaike, Masakazu Hashimoto, Yuji Hasegawa.*
3. The effect of micro groins on riverbed structures - Comparison of the velocity distribution in experiments with fixed and mobile bed, *Andreas Müller, Frank Seidel, Franz Nestmann.*
4. Hydro-morphological response to the change in groynes position and angle in sine-generated meandering channels of different sinuosity, *Saroj Karki, Hajime Nakagawa, Kenji Kawaike.*
5. Study on Riverbed Variation Management by groin at a River Confluence Associated with the Barrage Water, *Yoshihiro Okamoto, Junta Nishio, Keiichi Kanda, Kohji Michioku.*
6. Quantifying channel-floodplain connectivity in the Trinity River, TX with numerical modeling and field observations, *Paola Passalacqua, Shazzadur Rahman, Hima Hassenruck-Gudipati, David Mohrig.*
7. Two-dimensional modelling of bank erosion process in the Lower Jingjiang Reach of the Middle Yangtze River, *Shanshan Deng, Junqiang Xia, Meirong Zhou.*

1.14 1.3.6 Morphodynamics - Morphological response

1. A study on multifactorial riverbed degradation, *Juan Pedro Martin-Vide, Carles Ferrer-Boix.*
2. Estimating erosion and deposition without morphodynamic models, *Eleanor Pearson, Barry Hankin, Jonathan Carrivick, Rob Lamb.*
3. Changes in the equilibrium river profile due to interventions, *R. Pepijn van Denderen, Emiel Kater, Luc Jans, Susanne Quartel, Ralph M.J. Schielen.*
4. Evaluation of geomorphological characteristics in a quasi-equilibrium river channel, *Robin K. Biswas, Shinji Egashira, Daisuke Harada, Hiroyuki Ito.*

5. The morphological response of an Alpine catchment to a large infrequent disturbance, *Lorenzo Picco, Giacomo Pellegrini, Antonio Cazorzi, Riccardo Rainato, Lorenzo Martini, Marco Cavalli.*
6. Significance of deep-channel dynamics at Lower Jamuna bifurcation, *Sanjay Giri, Angela Thompson, Erik Mosselman, Gennadii Donchyts.*
7. Effect of tides on stability of bifurcations in river deltas, *Arya Iwantoro, Maarten van der Vegt.*
8. Modelling amplification effects of cascading failures of landside dams, *Mingfu GUAN, Qingyuan Yang, Yong Peng.*
9. Morphodynamics of downstream fining in rivers with unimodal sand-gravel feed, *Chenge An, Gary Parker, Xudong Fu.*
10. Effective discharge calculations: comparison of classic methods with a morphodynamic model on a reach of the Po River (Italy), *Hossien Hosseiny, Kyle Strom.*

1.15 1.4.1 Scour at In-stream Hydraulic Structures (Special Session) - Scour at In-stream Hydraulic Structures

1. Morphometric relation of obstacle marks at boulder-like obstructions in time, *Oliver Schlömer.*
2. The Influence of In-stream Bridge Structures on Free Surface Turbulence, *Erika Johnson, W. D. Miller, Geoff Smith, Jeffrey Bowles.*
3. Bedload sediment transport induced by channel-spanning instream structures, *Catherine Wilson, Elizabeth Follett.*
4. Analyzing the impact of wooden debris on scour and sediment transport, *Tim Johannsen, Martin Weber, Nicole Saenger.*
5. Predicting Maximum Scour in Bends of Sand-bed Rivers, *David Froehlich.*
6. Permeable groundsills in flow alternation and scour control for headwater streams, *Yu-Da CHEN, Chia-Chun WU.*
7. Flow hydrodynamics and scour around bridge pier during tsunami propagation in coastal rivers, *Ananth Wuppukondur, Tom Baldock.*
8. Innovative approach to the design of stilling basin: improvement of fish migration and scour utilization for energy dissipation, *Milan Zukal, Pavel Fošumpaur, Tomáš Kašpar, Martin Králík.*

1.16 1.5.1 Experimental techniques - Experimental techniques

1. A methodology to measure the threshold of the incipient motion of sediment load directly in rivers, *Lucrecia Alvarez, Rafael Murillo Muñoz.*
2. Quantifying uncertainties in the discharge distribution over the river Rhine branches using expert elicitation, *Jord J. Warmink, Matthijs R.A. Gensen, Sander Steenblik, Suzanne J.M.H. Hulscher.*
3. Optimal River Cross Section for Both Flood Control and Aquatic Habitat in Gravel Beds, *Youichi Yasuda, Morihito Harada, Pietro Beretta Piccoli.*
4. Measuring suspended mud flocs in the laboratory: a comparison between two methods, *Ehsan Abolfazli, Ryan Osborn, Kyle Strom.*
5. A simple theory and experiments for onset of flocculation in kaolin clay suspensions, *Nicholas Rommelfanger, Bernhard Vowinckel, Zixuan Wang, Eckart Meiburg, Paolo Luzzatto-Fegiz.*

6. Automated river ice freeze-up monitoring and characterization, *Saber Ansari, Colin D. Rennie, Shawn P. Clark, Ousmane Seidou.*
7. Assessment of sediment disaster and feasibility of countermeasures using physical hydraulic model, *Chia-Chun Wu, Pei-Hsi Wang, Hsiang-Chih Ni, Guei-Ling Fu, Cheng-Yi Hung, Hui-Ling Chen.*
8. On the development and calibration of a miniaturised instrumented particle for geomorphic hazards monitoring, *Khaldoon AlObaidi, Cameron Houston, Manousos Valyrakis.*

1.17 1.6.1 Instrumentation in river engineering and monitoring of geomorphic processes (Special Session) - Instrumentation in river engineering and monitoring of geomorphic processes A

1. Breaking of internal solitary waves generated by intrusions, *Claudia Adduce, Giovanni La Forgia, Luisa Ottolenghi.*
2. New developments of FUDAA-LSPIV, a user-friendly software to perform river velocity measurements in various flow conditions, *Magali Jodeau, Guillaume Bodart, Jérôme Le Coz, Alexandre Hauet, Jean-Baptiste Faure, Coraline Bel, Franck Leclercq, Hanna Haddad67, Cédric Legoût, Bertrand Marchand.*
3. Application of uav system and sfm techniques to develop high-resolution terrain models, *Marco La Salandra, Vittorio Pennella, Stefano Nicotri, Giacinto Donvito, Domenico Capolongo.*
4. The effect of surface gravity waves on the measurement of river surface velocity, *Giulio Dolcetti, Borbala Hortobagyi, Matthew Perks, Simon Tait.*
5. Monitoring the potential for bridge protections destabilization, using instrumented particles, *Yi Xu, Manousos Valyrakis, Panagiotis Michalis.*
6. Smart bridge: towards robust monitoring of environmental hazards, *Eftychia Koursari, Stuart Wallace, Yi Xu, Panagiotis Michalis, Manousos Valyrakis.*
7. Comparison of PIV and Optical flow for river flow applications, *Luis Mendes, Ana Margarida Ricardo, Alexandre Bernardino, Rui Miguel Lage Ferreira.*

1.18 1.6.2 Instrumentation in river engineering and monitoring of geomorphic processes (Special Session) - Instrumentation in river engineering and monitoring of geomorphic processes B

1. Current practices and future directions of monitoring systems for the assessment of geomorphological conditions at bridge infrastructure, *Panagiotis Michalis, Yu Xi, Manousos Valyrakis.*
2. Calibration of the Swiss plate geophone system at the Zinal field site with direct bedload samples and results from controlled flume experiments, *Tobias Nicollier, Dieter Rickenmann, Eric Travaglini, Arnd Hartlieb.*
3. Integration of low-cost technological solutions for flow rate and bedload transport monitoring in the Caldene river, Italy, *Vladislav Ivov Ivanov, Barbara Zanchi, Monica Papini, Alessio Radice, Laura Longoni.*
4. Evaluation of the deposit dynamics on a gravel bar after different hydrologic events, *Junjian Deng, Benoît Camenen, Thomas Drevet, Lionel Pénard.*
5. Sampling suspended sand in rivers using instantaneous horizontal bottle samplers: a comparison against other techniques, *David J Topping, Ronald Griffiths, Jérôme Le Coz, Benoît Camenen, Gilles Pierrefeu, Guillaume Dramais.*

6. Flow patterns and bed changes due to traditional river training structures “Seigyū”, *Sameh Kantoush, Mahmood Al Mamari, Sohei Kobayashi, Mohamed Saber, Yasuhiro Takemon, Tetsuya Sumi.*
7. Dam breach hydraulics and morphodynamics in overtopped earth dams with chimney filter, *Teresa Alvarez, Solange Valente, Silvia Amaral, Teresa Viseu, Rui M.L. Ferreira.*

1.19 1.7.1 Advances in Large-scale Hydraulic Experiments (Special Session) - Advances in Large-scale Hydraulic Experiments

1. A laboratory and numerical study of transverse momentum exchange in vegetated channels, *S. H. Truong, Wim Uijttewaal, Un Ji.*
2. Large-scale experiments for vegetated flows with different types of vegetation patch layouts, *Un Ji, Juha Järvelä, Inhyeok Bae, Kaisa Vastila, Hyungsuk Kim, Chanjoo Lee.*
3. Estimation of transverse mixing coefficients in shallow, gravel-bedded rivers, *Lorris Gond, Emmanuel Mignot, Jérôme Le Coz, Lylia Kateb, Alexis Buffet, Mickael Lagouy.*
4. Incipient motion of sand under combined flow and full-scale waves, *Jeanne Ewers.*
5. River training works research to improve navigation conditions on the Elbe River close to the Czech/Germany border, *Tomáš Kašpar, Pavel Fošumpaur, Martin Králík, Milan Zukał.*