

Understanding and Reducing Landslide Disaster Risk

Volume 4 Testing, Modeling and Risk Assessment





Contents

Binod Tiwari, Beena Ajmera, Sabatino Cuomo, Katsuo Sasahara, and Ryosuke Uzuoka	J
Part I Keynote Lectures	
Recent Developments in the Evaluation and Application of Residual and Fully Softened Shear Strengths for the Stability Analyses of Landslides	11
Oso Landslide: Failure Mechanism and Runout Analyses	47
Numerical Modelling for Slope Stabilizations in Modern Geotechnical Practice	65
Recent Advances in the Methods of Slope Stability and Deformation Analyses Beena Ajmera and Binod Tiwari	81
Engineering Risk Mitigation for Landslide Hazard Chains: The Baige Landslides on the Jinsha River in 2018	109
Part II Recent Development in Physical Modeling of Landslides	
Application of Magnetic Tracking System in Laboratory-Scale Rock Avalanche Model Tests	123
A Simple Physically-Based Distributed Translational Landslide Model Yanto, Sumiyanto, and Arwan Apriyono	131
Study on the Behaviour of Slope Instability Using Physical Modelling	137
Centrifuge Modelling of Slope Failure Due to Groundwater During Excavation Nobutaka Hiraoka, Naotaka Kikkawa, and Kazuya Itoh	147
Effects of Relative Density in Progressive Sliding of Tailing	157
Experimental Studies on the Effect of Vegetation Density to Change Underground Seepage Rate and Stability of Slopes	165

xxiv Contents

Laboratory Simulations of Submarine Landslide Failure Mechanisms Jonathan M. Carey, Joshu J. Mountjoy, Gareth J. Crutchley, Barbara Lyndsell, and David N. Petley	173
Laboratory Tests to Simulate the Rainfall Infiltration Process of Pyroclastic Soils Subject to Instability Gennaro Spolverino, Giovanna Capparelli, and Pasquale Versace	179
Part III Recent Development in Numerical Modeling of Landslides	
3D Analysis of a Fragmental Rockfall	187
3D Landslide Models in VR	195
A Coupled Discrete Element and Depth-Averaged Model for Flow-Like Landslide Simulations Xiaoli Su, Xilin Xia, and Qiuhua Liang	205
Advanced Methods for Simulating Complex Landslides Martin Mergili and Shiva P. Pudasaini	211
Application of Reciprocal Green's Functions on the Forecast of Submarine Landslide Tsunamis Guan-Yu Chen, Chin-Chih Liu, and Yi-Fung Wang	217
Deformation Characteristics with Porewater Pressure Development of Shallow Landslide Triggered by Rainfall Infiltration Kuo-Hsin Yang, Thanh Son Nguyen, Harianto Rahardjo, and Der-Guey Lin	227
Debris Flow Simulations Due to Landslide Dam Outburst and Considering Effective Countermeasures Kana Nakatani, Ken'ichirou Kosugi, and Yoshifumi Satofuka	235
Preliminary Results from the SMART-SED Basin Scale Sediment Yield Model Federico Gatti, Luca Bonaventura, Alessandra Menafoglio, Monica Papini, and Laura Longoni	241
Hazard Assessment of a Rainfall-Induced Deep-Seated Landslide in Hakha City, Myanmar Khang Dang, Doan Huy Loi, Kyoji Sassa, Do Minh Duc, and Nguyen Duc Ha	249
Landslide Hazard Zoning Based on the Integrated Simulation Model (LS-Rapid) Doan Huy Loi, Kyoji Sassa, Khang Dang, and Hong Le Luong	259
Numerical Models of Debris Flows with Entrainment Analysis-Case Studies from the Republic of Serbia Jelka Krušić, Biljana Abolmasov, and Miloš Marjanović	267
Numerical Simulation of a Creeping Landslide Case in Japan	273
Numerical Simulation of Debris Flows After Ash Fall at Mt. Fuji	281

On the Progression of Slope Failures Using Inverse Velocity of Surface Movements in an Undercut Slope Model	293
Rainfall Boundary Condition in a Multiphase Material Point Method	303
Response of Slopes to Earthquakes and Rainfall Jiawei Xu, Ryosuke Uzuoka, and Kyohei Ueda	311
Reproduction of Sedimentation State During Rock Slope Failure Using the Simplified DEM Model Hitoshi Nakase and Yukio Nakata	321
Part IV Recent Development in Soil and Rock Testing Techniques, Application and Analysis Methods	
Analysis of Shear Strength Variability of Ash-Fall Pyroclastic Soils Involved in Flow-Like Landslides. Rita Tufano, Luigi Annunziata, Enrico Di Clemente, Giovanni Falgiano, Francesco Fusco, and Pantaleone De Vita	329
Comparison of Soil Parameters and Soil Moduli E ₅₀ and E ₇₀ of Residual Soils Used in Stability Analysis L. K. N. S. Kulathilake, E. H. N. Premasiri, and A. A. Virajh Dias	335
Influence of Plant Root Asperities and Architectural Traits on Soil Shear Resistance	341
Modelling of Creep Behavior of Claystone in Mae Moh Open-Pit Mine Using the Soft Soil Creep Model Pongsakorn Wongchana, Peerapong Jitsangiam, Suriyah Thongmunee, and Tawatchai Tanchaisawat	349
Monotonic and Cyclic Behaviour of Tephra Layer Landslide at Takanodai from the 2016 Kumamoto Earthquake	357
Shearing Rate Effect on Residual Strength of Typical Clay Soils in Ring Shear Test Deepak Raj Bhat	365
Simple Shear Tests for Unsaturated Soils	371
Simplest Methods of Determining Dynamic Soil Properties for Use in Co-seismic Hazard Analysis Beena Ajmera and Binod Tiwari	379
The Acoustic Emission Characteristics and Shear Behaviour During Granular Shearing	385

xxvi Contents

Part V Recent Advancements in the Methods of Slope Stability and Deformation Analyses	
Prediction of Deformation of Caisson Type Piles in Open cut Works and Countermeasures Employing Early Closure Method	393
Slope Stability Assessment of Weak and Weathered Rocks with BQ System Timur Ersöz, Merve Özköse, and Tamer Topal	401
Soil Databases to Assist Slope Stability Assessments in the Eastern Caribbean Paul J. Vardanega, Elizabeth A. Holcombe, Myrto Savva, Casey J. Shepheard, Rose Hen-Jones, and Flavia De Luca	407
The Mt Gamalama Instability Level in Generating Landslide-Induced Tsunami in Ternate Island, Indonesia Saaduddin, Jurgen Neuberg, Mark E. Thomas, and Jon Hill	415
Part VI Recent Development in Disaster Risk Assessment	
Effect of Pore Pressure Dynamics on Progressive Failure in a Clayey Glaciolacustrine Landslide Kelvin Sattler, David Elwood, Michael T. Hendry, David Huntley, Jessica Holmes, and Paul B. Wilkinson	423
Engineering Geological Investigation and Slope Stability Analysis for Landslide Hazard Assessment in Indian Himalayas	431
First Consideration About Post 2017 Wildfire Erosion Response and Debris Flow in Susa Valley (NW Italy) Damiano Vacha, Giuseppe Mandrone, Matteo Garbarino, and Donato Morresi	443
Identification of Sliding Surface and Crack Pattern in the Soil Creep, Case Study: Unika Soegijapranata Campus, Semarang, Central Java, Indonesia Wahyu Wilopo, Hendy Setiawan, Doni Prakasa Eka Putra, and Teuku Faisal Fathani	451
Preliminary Result of Real-Time Landslide Monitoring in the Case of the Hinterland of Koroška Bela, NW Slovenia Tina Peternel, Ela Šegina, Matija Zupan, Mateja Jemec Auflič, and Jernej Jež	459
Quantitative Risk Analysis of Earthquake-Induced Landslides	465
Role of Remote Sensing Technology in Landslide Risk Management of Hong Kong Julian S. H. Kwan, W. K. Leung, and Clarence E. Choi	471
The Characteristics of the Vegetation Distribution Related to the Slope Failure Caused by the Earthquake Yoshikazu Tanaka, Kyohei Ueda, and Ryosuke Uzuoka	479