TABLE OF CONTENTS

The Impact of Technology on Sport ................................................................. 1
   A. Sabic, F. K. Fuss, P. Clifton, K. M. Chan

Influence of Ball Properties on Simulated Ball-to-Head Impacts .................. 4
   Derek Nevin, Lloyd Smith

The Development and Application of a Live Transmitting Head Camera for Video Feedback in Rugby Decision Making ....................................... 10
   Hayden Croft, Daniel Cury, Ribeiro

Developing and Applying a Tri-axial Accelerometer Sensor for Measuring Real Time Kayak Cadence .................................................. 16
   Hayden Croft, Daniel Cury, Ribeiro

Surface Electromyography Measurements of Dorsal Muscle Cross-activation in Therapeutic Climbing ..................................................... 22
   F. Mally, S. Litzenberger, A. Sabo

Feasibility of Using Virtual and Body Worn Inertial Sensors to Detect Whole-body Decelerations during Stopping .................................... 28
   William H. Gageler, David Thiell, Jonathan Neville, Daniel A. James

Second Generation Swimming Feedback Device Using a Wearable Data Processing System based on Underwater Visible Light Communication .................................................. 34
   Rabee M. Hugena, Tim Haelig, Steven G. O’Keefe, Andy Stann, Thomas Fickenschel, David V. Thiell

Studies into the Mechanisms of the Cross-country Ski Vibrations and Possible Models of the Phenomenon ..................................................... 40
   Andrey Koptyug, Mikael Bäckström, Mats Tinnsten

Body Climate Differences for Men and Women Wearing Functional Underwear during Sport at Temperatures below Zero Degrees Celsius ........................................ 46
   B. Schindelka, S. Litzenberger, A. Sabo

Estimation of Rebound Position in Basketball ............................................. 51
   Hiroki Okubo, Mont. Hubbard

Activity of Trunk and Leg Muscles during Stand up Paddle Surfing ............ 57
   C. Ruess, K.H. Kristen, M. Eckelt, F. Mally, S. Litzenberger, A. Sabo

Stand up Paddle Surfing-An Aerobic Workout and Balance Training ......... 62
   C. Ruess, K.H. Kristen, M. Eckelt, F. Mally, S. Litzenberger, A. Sabo

Free Flight and Wind Tunnel Measurements of the Drag Exerted on an Archery Arrow ................................................................. 67
   K. Okawa, Y. Komori, T. Miyazaki, S. Taguchi, H. Sugita

Simulating Sport Ball Impact Through Material Characterization ............... 73
   Lloyd Smith, Scott Burbank

A Portable Roller Ski Rolling Resistance Measurement System ................ 79
   Mats Ainegren, Peter Carlsson, Mats Tinnsten

Simulation of Riding a Full Suspension Bicycle for Analyzing Comfort and Pedaling Force .......................................................... 84
   Yung-Sheng Liu, Tswen-Syau Tsai, Chao-Ping Chen, Hung-Chuan Pan

A Review on Skin Suits and Sport Garment Aerodynamics: Guidelines and State of the Art .............................................................. 91
   Luca Oggianno, Len Brownhile, Olga Troynikov, Lars Morten Bardal, Camilla Sæter, Lars Sætran

Dynamic Measurements and Drag Crisis Hysteresis in Garment Aerodynamics ................................................................. 99
   Luca Oggianno, Lars Morten Bardal, Camilla Sæter, Lars Sætran

Turnover Stability of Shuttlecocks - Transient Angular Response and Impact Deformation of Feather and Synthetic Shuttlecocks ................... 106
   Calvin S.H. Lin, C.K. Chua, J.H. Yeow

A Novel Approach to Study Locomotion in Under-g Load Bearing Conditions ............................................................... 112
   Katina Mira Fischer, Steffen Willwacher, Martin Käsel-Feldker, Gert-Peter Brüggemann

On Optimization of Pacing Strategy in Road Cycling ............................... 118
   David Sundström, Peter Carlsson, Mats Tinnsten

A Novel Method for the Evaluation and Certification of false Start Apparatus in Sprint Running .......................................................... 124
   Steffen Willwacher, Martin-Käsel Feldker, Sebastian Zohren, Volker Herrmann, Gert-Peter Brüggemann

Spin from Oblique Impact of Batted Sports Balls ...................................... 130
   Jeffrey R. Kensrud, Lloyd V. Smith

Clubhead presentation and spin control capability of elite golfers ................ 136
Impact Energy Attenuation Performance of Cricket Helmets: Standard 2-wire Drop Test vs. Pitching

Toh Yen Pang, Aleksandar Subic, Monir Takla

Design and Evaluation of Sport Garments for Cold Conditions Using Human Thermoregulation

Modeling Paradigm

Christopher Watson, Nazia Nawaz, Olga Troyinkov

Influence of Material Properties and Garment Composition on Pressure Generated by Sport Compression Garments

Olga Troyinkov, Wiak Wardeningsih, Andrey Koptyag, Chris Watson, Luca Oggiano

Consumer Purchase Behaviour of Sports Compression Garments – A study of Generation Y and Baby Boomer Cohorts

Monika Rahalain, Olga Troyinkov, Chris Watson, Marius Janta, Veit Senner

Influence of Protective Pad Integrated into Sport Compression Garments on their Pressure Delivery to Athlete’s Lower Limbs

Wiak Wardeningsih, Olga Troyinkov, Andrey Molotsnikov, Yuri Estrin

An Alternative Technique for Investigating Fluid flow Around the Hand During Front Crawl

Anjali Udeshi, Ben Halkon, Jeremy Coupland

Arm Movement: The Effect of Obesity on Active Lifestyles

David V. Thiel, Hugo G. Espinosa, Glen M. Davis, Elizabeth Dylke, Nasim Foroughi, Sharon L. Kilbreath

Indoor Propagation Investigation From a 2.4 GHz Waist Mounted Beacon

James A. Kirkup, David D. Rowlands, David V. Thiel

Novel Biosensor for InterLeukin-6 Detection

Jingfeng Huang, James Harvey, W. H. Derrick Fam, Myra A. Nimmo, I. Y. Alfred Tok

Determining Maximum Push-off Velocity in Swimming Using Accelerometers

Andy Stamm, Daniel A. James, Brendan B. Burkett, Rabee M. Hagem, David V. Thiel

Determination of Insulation Properties of Functional Clothing Using Core Body Temperature Gradients as Quantification Parameter

Jonathan Bulat, Marius Janta, Veit Senner, Johannes Kreuzer

Sports Technology Education at Mid Sweden University

Mikael Bäckström, Mats Tinnsten, Andrey Koptyag, Lars-Erik Rännar, Peter Carlsson, Jonas Danvind, Håkan Wiklund

Technology Applications to Enhance Understanding of Real-time Snowsport Head Accelerations

Tracey J. Dickson, Gordon Waddington, Stephen Trathen, Daniel Baltis, Roger Adams

A Feedback System for the Motor Learning of Skills in Golf

A Automated Activity Monitoring System for Rehabilitation

David D. Rowlands, Wayne Usher, Mitchell McCarthy, Raymond Leadbetter, Jason Ride, Leanne Casey, Heather Green, Norman Morris, Vallipuram Muthukumarasamy, E-Lisa Laakso, Daniel A. James

Does Wearing a Wrist Guard Affect the Site of Wrist Fracture in Snow Sports?

Gordon Waddington, Tracey J. Dickson, Stephen Trathen, Anna Waddington

Sports Monitoring Data and Video Interface Using a GUI Auto Generation Matlab Tool

Hugo G. Espinosa, Daniel A. James, Sean Kelly, Andrew Wixted

Characteristics of Ball Impact on Curve Shot in Soccer

Sungchan Hong, Youngjun Go, Keiko Sakamoto, Masao Nakayama, Takeshi Asai

Difference in Kicking Motion between Female and Male Soccer Players

Keiko Sakamoto, Yutaka Shimizu, Eiko Yamada, Sungchan Hong, Takeshi Asai

The Influence of the Parameters of the Vertical Runner Model on Ground Reaction Force in Different Running Styles

Harutoshi Yukawa, Yuma Ishikura, Shozo Kawamura

Development of a Simulator Generating Ski Board Vibrations in Actual Skiing

Akira Shionoya, Kazuhide Sato


Takahiko Kimura, Masaaki Ohba, Akira Shionoya

Shock Attenuation Properties of Long Pile Synthetic Turf by Using Multi-intensity Multi-area Impact Test

Harutoshi Yukawa, Yuta Fujimoto, Shozo Kawamura, Kazutoshi Kobayashi

Development of a Test Method for the Comparative Analysis of Bicycle Saddle Vibration Transmissibility

Nicola Petrone, Federico Giubilato

Aerodynamic Hysteresis of a Discus

Kazuya Seo, Ken Ohta, Yuji Ohgi, Yuji Kimura
The Effect of a Knee-ankle Restraint on ACL Injury Risk Reduction during Jump-landing .............................................. 300
Phillis S.P. Teng, K.F. Leong, P.Y. Huang, J. McLaren

Motion Analysis and Joint Angle Measurement of Skier Gliding on the Actual Snow Field Using
Inertial Sensors ................................................................................................................................................................. 307
Akiko Kondo, Hitoshi Doki, Kiyoshi Hirose

Characteristics of the Long Jump Take-off as the Novice Increases the Number of Steps in the Approach Run ............................................................................................................................. 313
Yoshinori Kinomura, Nobuaki Fujiyabashi, Koji Zashi

Evaluation of Ergonomics of a New Effort Saving Via-ferrata Carabiner-child vs. Adult Use ......................................................... 319
Stefan Lehner, Veit Senner

Optimization of a Foot Model for the Evaluation of the Injury Risk during Cutting Movements in Football ................................................. 325
Stefan Lehner, Christine Dieffl, Dennis Chang, Veit Senner

A New Method for Designing Sportswear by Using Three Dimensional Computer Graphic Based
Anisotropic Hyperelastic Models and Musculoskeletal Simulations ....................................................................................... 331
Takatsugu Shimana, Motomu Nakashima, Akihiro Matsuda, Kazuhiro Omori

On-track Measurements of Neck Movements and Muscle Activity during Motocross Sessions with or without Neck Brace ........................................................................................................................................... 337
Luca Gorasso, Nicola Petrone

Homogenization Analysis of Porous Polymer Considering Microscopic Structure ....................................................................................... 343
Yoshikatsu Shioda, Akihiro Matsuda

3D-CG Based Stress Calculation of Competitive Swimwear Using Anisotropic Hyperelastic Model ........................................... 349
Akihiro Matsuda, Hiromu Tanabe, Takeya Nagaoka, Motomu Nakashima, Takatsugu Shimana, Kazuhiro Omori

Dynamic Analysis and Motion Measurement of Ski Turns Using Inertial and Force Sensors ................................................ 355
Kiyoshi Hirose, Hitoshi Doki, Akiko Kondo

A Pilot Study: Evaluations of Compression Garment Performance via Muscle Activation Tests ........................................... 361
Ping Wang, Jason McLaren, Kah Fai Leong, Pascal Joubert des Ouches

3D-CG Based Musculoskeletal Simulation for a Swimmer Wearing Competitive Swimwear ....................................................... 367
Motomu Nakashima, Takahiro Hasegawa, Akihiro Matsuda, Takatsugu Shimana, Kazuhiro Omori

A Pilot Study: Evaluating the Influence of Knitting Patterns and Densities on Fabric Properties for Sports Applications ................................................................. 373
Sandep Kumar Tiwari, Pauline Toh Chien Fei, Jason David McLaren

Evaluation of Aerodynamic Drag Utilizing a Viscoelastic Model ............................................................................................... 378
Keisuke Hata, Akira Shionoya, Hazim Moria, Harun Chowdhury, Firoz Alam

The Development of a Curling Simulation for Performance Improvement based on a Physics Engine ........................................ 385
Myeong-Hyeon Heo, Dongho Kim

Curling Analysis based on the Possession of the Last Stone Per End .......................................................................................... 391
Sung Geon Park, Soonwon Lee

A Mechanical Study on Tennis Racquets to Investigate Design Factors that Contribute to Reduced Stress and Improved Vibrational Dampening ........................................................................... 397
Lisa Ferrara, Anders Cohen

A Method for the Quantitative Correlation between Quality Requirements and Product Characteristics of Sport Equipment .................................................................................................................. 403
Federico Giubilato, Nicola Petrone, Valentino Franch

Smartphones: Feasibility for Real-time Sports Monitoring ............................................................................................................. 409
M.W. McCarthy, D.A. James, D.D. Rowlands

Visualization of Pedaling Technique Using Cleat-size Biaxial Load Cells ................................................................................... 415
Kento Yamashita, Akihiro Matsuda, Keisuke Ishikura, Hideki Takagi, Shinichiro Otsuka

Near Real Time Network Simulation for Team Sports Monitoring ................................................................................................. 422
Daniel A. James, Lino Fanella, Roberto Cusani

Development of a Motion System for an Advanced Sailing Simulator ......................................................................................... 428
Fabian A. Mulder, Jouke C. Verlinden

Enhancement of Presence in a Virtual Sailing Environment through Localized Wind Simulation .................................................. 435
Jouke C. Verlinden, Fabian A. Mulder, Joris S. Vergeest, Anna de Jonge, Darina Krutiy, Zsuzsa Nagy, Bob J. Logeman, Paul Schouten

A Sports Technology Needs Assessment for Performance Monitoring in Swimming ................................................................. 442
Jason Ride, Caroline Ringuet, David Rowlands, James Lee, Daniel James

Kick Precision and Spin Rate in Drop and Torpedo Punts ............................................................................................................. 448
Franz Konstantin Fuss, Robert Masterton Smith, Florent Leali

Should the Finger Pressure be Well Distributed Across the Seam in Seam Bowling? A Problem of Precession and Torque .......................................................................................................................... 453
Franz Konstantin Fuss, Robert Masterton Smith
Simulation based Upon Medical Data Offers a Fast and Robust Method for the Prediction of Fracture Risk
Nicholas J. Emerson, Matt J. Carre, Gwendolen C. Reilly, Amaka C. Offiah

An Experimental Study of Baseballs and Softballs
Firoz Alam, Harun Chowdhury, Nurdalila Husni, Lloyd Smith

On-road and Wind Tunnel Aerodynamic Study of Human Powered Vehicles
Firoz Alam, Harun Chowdhury, Erika Guillaume, Jie Yang, Gary Zimmer

An Experimental Study of Airflow Behaviour around a Standard 2-man Bobsleigh
Harun Chowdhury, Firoz Alam, Stefano Arena, Israt Mustary

An Experimental Study of New Rule Javelins
Harun Chowdhury, Firoz Alam, Anthony Muscara, Israt Mustary

Measurement of the Coefficient of Friction and the Centre of Pressure of a Curved Surface of a Climbing Handhold
Franz Konstantin Fuss, Lisa Burr, Yehuda Weizman, Günther Niegl

A Method for Accurate Measurement of the Non-linear Rolling Friction Coefficient between an Instrumented Ball and a Surface
Yehuda Weizman, Franz Konstantin Fuss, Batdelger Doljin

Author Index