

Contents

Introduction	15
--------------	----

PART ONE: KEYNOTE PAPERS

Vibration exposure in alpine skiing and consequences for muscle activation levels	19
---	----

P. Federolf, V. von Tscharner, D. Haeufle, B. Nigg, M. Gimpl and E. Müller

Importance of sensorimotor training for injury prevention and athletic performance	26
--	----

A. Gollhofer and M. Gruber

Eccentric exercise in alpine skiing	33
-------------------------------------	----

H. Hoppeler and M. Vogt

Alpine skiing technique – practical knowledge and scientific analysis	43
---	----

S. Loland

Stimuli and stimulation: hypoxia and mechanics	59
--	----

J. Mester, S. Achtzehn, M. de Marées, E. Engelmeyer, A. M. Liphardt and F. Suhr

PART TWO: INVITED PAPERS

Diet and muscle fatigue during two weeks of alpine ski training	75
---	----

D. W. Bacharach and K. J. Bacharach

Prediction of ankle ligament elongations in snowboarding using a kinematic model	88
--	----

S. Delorme, M. Lamontagne and S. Tavoularis

Contents

The competitive Cross - Country Skier – an impressive human engine	102
H.-C. Holmberg	
Equipment development and research for more performance and safety	111
V. Senner, S. Lehner and H. Böhm	
PART THREE: ALPINE SKIING	
Alpine skiing and snowboarding training system using induced virtual environment	137
V. Aleshin, S. Klimenko, M. Manuilov and L. Melnikov	
Heart rate recovery in young alpine skiers with congenital heart disease	145
M. Bernhörster, A. Rosenhagen, M. Castano, L. Vogt, R. Hofstetter and W. Banzer	
Emotional experiences and FLOW in easy bump pistes	152
T. Brandauer, T. Felder and V. Senner	
How to ski faster: art or science?	162
M. Brodie, A. Walmsley and W. Page	
Modeling edge-snow interactions using machining theory	175
C. A. Brown	
Predictors of falls in downhill skiing and snowboarding	183
M. Burtscher, R. Pühringer, I. Werner, R. Sommersacher and W. Nachbauer	
Preliminary results on the role of the coach-athlete relationship in a developing ski nation	188
S. Chroni, I. Lefoussi and M. Kalomirou	

Contents

Measurement of dynamical ski behavior during alpine skiing	195
M. Fauve, M. Auer, A. Lüthi, H. Rhyner and J. Meier	
Analysis of skiers' performance using GPS	207
P. J. Gómez-López, O. Hernán and J. V. Ramírez	
System-Theory-Based-Model-Building for a practice and theory of alpine skiing	216
H. Haag	
Calculation of the pressure distribution between ski and snow	229
D. Heinrich, P. Kaps, M. Mössner, H. Schretter and W. Nachbauer	
Eccentric and concentric torque of knee extension and flexion in alpine ski racers	242
H. Hoshino, K. Tsunoda and T. Sasaki	
Influence of the skier's body geometry on the duration of the giant slalom turn	252
Ž. Hraski and M Hraski	
Description of race courses and estimation of ground reaction forces by GPS-Data and video	260
A. Huber, K.-H. Waibel and P. Spitzelpfeil	
Identification of the physical characteristics that discriminate between competitive levels and specialties of alpine skiers	272
F. M. Impellizzeri, E. Rampinini, M. Freschi, N. A. Maffiuletti, M. Bizzini and P. Mognoni †	
Development of a measuring system on ski deflection and contacting snow pressure in turns	281
H. Kagawa, T. Yoneyama, D. Tatsuno, N. Scott and K. Osada	
Not the skier – but the slope turns the skis	292
G. Kassat	

Contents

Athlete responses to using a real time Optical Navigation Feedback System during ski training	304
R. Kirby	
Influence of physical fitness on individual strain during recreational skiing in the elderly	310
S. Krautgasser, P. Scheiber, J. Kröll, S. Ring-Dimitriou and E. Müller	
EMG signal processing by wavelet transformation – applicability to alpine skiing	320
J. Kröll, J. M. Wakeling, J. Seifert and E. Müller	
Effects of a mock-up force plate on riding technique and perception – a prerequisite for comprehensive biomechanical analyses in mogul skiing	327
N. Kurpiers, U. G. Kersting and P. R. McAlpine	
Robot imitating human skiing used for teaching and equipment testing	337
L. Lahajnar and B. Nemeč	
Applications of physics education research to skiing pedagogy for coaches and instructors	347
R. LeMaster	
H:Q ratios in open versus closed kinetic chain: what is the relevance for alpine ski racers?	357
S. Lembert, C. Raschner, H.-P. Platzer, C. Patterson and E. Mildner	
Physiological profile of Swiss elite alpine skiers – a 10-year longitudinal comparison	365
N. A. Maffiuletti, K. Jordan, H. Spring, F. M. Impellizzeri and M. Bizzini	
Effects of ski stiffness in a sequence of ski turns	374
M. Mössner, D. Heinrich, P. Kaps, H. Schretter and W. Nachbauer	

Power endurance testing in alpine ski racing	389
C. Patterson, C. Raschner, H.-P. Platzer and S. Lembert	
Acquisition of EMG signals during slalom with different ski boots	399
N. Petrone, G. Marcolin, M. De Gobbi, M. Nicoli and C. Zampieri	
Loading conditions and neuromuscular activity during vertical knee flexion-extension and turn-like movements in a new skiing simulator under vibration conditions	410
R. Pozzo, F. Zancolò, A. Canclini and G. Baroni	
Turn characteristics and energy dissipation in slalom	419
R. Reid, M. Gilgien, T. Moger, H. Tjørhom, P. Haugen, R. Kipp and G. Smith	
Transfer from inline-skating to alpine skiing learning in physical education	430
B. Román, M ^a . T. Miranda, M. Martínez and J. Viciana	
Quantitative assessment of physical activity during leisure alpine skiing	439
A. Rosenhagen, C. Thiel, L. Vogt and W. Banzer	
Guided Alpine Skiing – Physiological demands on elderly recreational skiers	445
P. Scheiber, S. Krautgasser, J. Kröll, E. Ledl-Kurkowski and E. Müller	
Biomechanical basis for differential learning in alpine skiing	454
W. I. Schöllhorn, P. Hurth, T. Kortmann and E. Müller	
Cumulative muscle fatigue during recreational alpine skiing	465
J. Seifert, J. Kröll and E. Müller	
Mechanical load and muscular expenditure in alpine ski racing and implications for safety and material considerations	479
P. Spitzenpfeil, A. Huber and K. Waibel	

Contents

Relationship between vertical jumps and different slalom courses	487
V. Strojnik and A. Dolenc	
A step forward in 3D measurements in alpine skiing: a combination of an inertial suit and DGPS technology	497
M. Supej	
Measurement of ski deflection and ski-snow contacting pressure in an actual ski turn on the snow surface	505
D. Tatsuno, T. Yoneyama, H. Kagawa, N. Scott and K. Osada	
Physiologic characteristics of leisure alpine skiing and snowboarding	516
C. Thiel, A. Rosenhagen, L. Roos, M. Huebscher, L. Vogt and W. Banzer	
The influence of the laterality of the lower limbs on the symmetry of connected carving turns	523
F. Vaverka and S. Vodickova	
The method of time analysis of a carving turn and its phases	532
S. Vodickova and F. Vaverka	
Respiratory and metabolic demands of field versus laboratory tests in young competitive alpine ski racers	543
S. P. von Duvillard, D. Bacharach and F. Stanek	
Assessment of timing and performance based on trajectories from low-cost GPS/INS positioning	556
A. Waegli, F. Meyer, S. Ducret, J. Skaloud and R. Pesty	
Performance analyses in alpine ski racing regarding the characters of slopes and course settings	565
K. Waibel, A. Huber and P. Spitzenspfeil	

PART FOUR: CROSS COUNTRY SKIING

3D analysis of the technique in elite ski-touring and cross-country skiers engaged in world cup races and on a treadmill	575
A. Canclini, G. Baroni, R. Pozzo, M. Pensini and G. Rossi	
Individual modeling of the competition activities for elite female ski races during the 2006-2007 season	585
A. Čepulėnas	
Intra- and inter-individual variations in the daily haemoglobin and hematocrit concentration in elite cross country skiers caused by different body positions, state of hydration, exercise and altitude	596
E. Engelmeyer, M. de Marées, S. Achtzehn, C. Lundby, B. Saltin and J. Mester	
Visibility and availability of GPS in cross-country skiing	607
A. Krüger, K. Sikorski, J. Edelmann-Nusser and K. Witte	
Simulation of classical skiing using a new ski tester	615
V. Linnamo, V. Kolehmainen, P. Vähäsöyrinki and P. Komi	
Balance performance of elderly cross-country skiers - standing still or swaying smart?	621
V. Lippens and V. Nagel	
Biomechanics in classical cross-country skiing – past, present and future	630
W. Rapp, S. Lindinger, E. Müller and H.-C. Holmberg	
Biomechanical factors of biathlon shooting in elite and youth athletes	641
G. Sattlecker E. Müller and S. Lindinger	
Effectiveness of ski and pole forces in ski skating	647
G. Smith, B. Kvamme and V. Jakobsen	

Contents

Competition analysis of the last decade (1996 – 2008) in cross-country skiing 657

T. Stögg, J. Stögg and E. Müller

PART FIVE: SNOWBOARDING

Jump landings in snowboarding: an observational study 681

P. McAlpine, N. Kurpiers and U. Kersting

Influence of physical fitness parameters on performance in elite snowboarding 690

H.-P. Platzer, C. Raschner, C. Patterson and S. Lembert

Optimizing snowboard cross and ski cross starts: a new laboratory testing and training tool 698

C. Raschner, H.-P. Platzer, C. Patterson, M. Webhofer, A. Niederkofler, S. Lembert and E. Mildner

Lift generation in soft porous media with application to skiing or snowboarding 708

Q. Wu and Q. Sun

PART SIX: SKI JUMPING

Kinematic analysis of the landing phase in ski jumping 721

F. Greimel, M. Virmavirta and H. Schwameder

Stability during ski jumping flight phase 728

F. Hildebrand, V. Drenk and S. Müller

The relationship between the timing of take-off action and flight length by using the doll-model 737

T. Sasaki, K. Tsunoda, H. Hoshino, S. Miyake and M. Ono

PART SEVEN: HIGH ALTITUDE TRAINING IN SKIING

Effect of hypoxic training on angiogenetic regulators and mesenchymal stem cells	747
M. de Marées, P. Wahl, F. Suhr, S. Achtzehn, A. Schmidt, W. Bloch and J. Mester	
The anatomical hazards of the grip wrist tunnel syndromes	759
S. Provyn, P. Van Roy and J. P. Clarys	
Oxygen uptake during local vibration and cycling	769
B. Sperlich, H. Kleinöder, M. de Marées, D. Quarz and J. Mester	
Effects of short term high-intensity exercise under normoxic and hypoxic conditions and warming up on erythrocyte and plasma lactate concentrations after a giant slalom simulation	779
P. Wahl, C. Zinner, E. Lenzen, M. Hägele, S. Achtzehn, W. Bloch and J. Mester	
Index of authors	792