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Preface

Sports engineering is the glue that holds together all of sports. It has a broad base, encompassing all the fields of engineering that have to do with design of equipment, enhancement of performance in sporting events through modeling and simulation, design of experimental systems and experiments to measure techniques and performances of competitors, and all other technical aspects of sports. It also deals with the development of educational programs to perpetuate the science and art of sports. One of the main roles of sports engineering is to focus on using improvements in science and technology to better understand and enhance equipment efficacy and individual performance in all sports. Engineers in sports, recreation and fitness have the same goals as other sports professionals: enhance performance; prevent injury; assure safety; increase enjoyment and health benefits; support longevity, accessibility and diversity (to participate throughout the human life cycle regardless of physical challenge).

Sports engineering naturally includes materials, dynamics, design, manufacturing and experimental techniques. It is the intellectual fabric that allows for the design and evolution of equipment with the potential to revolutionize specific sports. As an example, the introduction of fiberglass pole vaulting poles in the early 1960's dramatically changed the rate of improvement of the world record. Similar instances of remarkable changes in the evolution of specific sports as a result of improvements in equipment have occurred in the javelin throw, tennis and golf, to name only a few.

Sports typically involve motion. This allows mathematical models based on Newton's Laws to be developed of the dynamics of the human competitors and their implements and/or vehicles. The models assist in improving our basic understanding of the events. In addition, such models can assist in the design of implements and equipment to withstand the loads of continual use, providing safety and durability for the user.

These two volumes of the proceedings contain 172 papers presented at the 5th Conference on Engineering of Sport held on the campus of the University of California, Davis, during September 13-16, 2004. The conference was jointly sponsored by the International Sports Engineering Association and the Bioengineering Division of the American Society of Mechanical Engineers. Although papers were contributed from more than 15 countries, the meeting and proceedings had a particularly American flavor.

Numerous special sessions addressed many aspects of the sports of baseball, golf, swimming, gymnastics, track and field, cycling, soccer, skiing, tennis, fly fishing, rock climbing, and winter sports. In addition many papers touched on more general topics such as shoes/surfaces, design, applied aerodynamics and hydrodynamics, experimental techniques, education, entrepreneurship and industrial concerns.

The 5th Conference on Engineering of Sport continues a series of meetings held since 1996 in Sheffield (2), Sydney and Kyoto. The 5th Conference witnessed a 50% growth in the number of papers and a broadening of participation to include more industrially affiliated engineers and scientists. The next conference is scheduled to be held in Munich, Germany in the summer of 2006.

The two volumes are organized along fields rather than categorized into specific sports, in order to better show the relations between and the interdisciplinary flavor of the fields. The quality of the papers herein is due to the hard work and diligence of both the authors and the reviewers who contributed to this volume. We also gratefully acknowledge the editorial assistance of Amanda Staley from ISEA headquarters at Sheffield University, whose help has been invaluable.

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Editors
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