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(Eds.)

Plant Growth Modeling and Applications

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Preface

As stepping into a new millennium, human population is facing increasing global challenges, such as environmental deterioration and natural resource shortages. In addition, over 10% of world's population (i.e 840 million people based on the FAO estimation data within 1998-2000) are suffering from food shortage and much more from freshwater shortage. Basically, these challenges are closely related to plant production. Although plants are the most fundamental organisms on earth supporting people living, we are yet unfortunately still far from attaining a reasonable quantitative knowledge of plant growth and development.

Plant study has been largely an experimental science. Agronomic practices are traditionally based on empirical knowledge. Up to now, there are no well accepted laws to describe the overall dynamic behaviors of plant growth. But in fact, applications in agronomy and forestry do require mathematical tools for contrained optimization of plant yields. For instance, water usage is a global issue in agriculture, which is responsible for about 70% of all the freshwater withdrawn (according to FAO figures). The potential for reducing the water use is quite high if we have a reliable tool for plant growth simulations.

Either for a quantitative understanding or for a better application of plants, plant growth modeling and simulation are indispensably important. Furthermore, accurate geometrical representations and visualization techniques have amplified a direct and fast cognition for modelers and users to verify their plant models, as well as to reuse or interpret the simulation results. Expectation of integrating modeling and representation techniques seems growing more and more in the field of agronomy and land use studies.

For promoting multidisciplinary exchanges concerning real and virtual plant modeling and their applications in botany, agronomy, environmental sciences, computer sciences and applied mathematics, LIAMA together with Chinese Agriculture University (CAU) organize "2003' International Symposium of Plant Growth Modeling, Simulation, Visualization and Their Applications (PMA03)" in Beijing, China, during October 13-16, 2003.

This book reports the 40 scientific contributions (including 4 invited papers) published in the Symposium. Graduate students, engineers, teachers and researchers can find in this book basic elements, advanced approaches, examples and applications of plant growth modeling, simulation, visualization and their applications.

The contributions of these proceedings cover a wide range of complexity and approaches. They are organized hereby in three main chapters: plant growth models, simulation and visualization techniques and, finally, applications. The reader could also understand these contributions as a graduate complexity scheme starting from single plant monodispliciplanary study approaches to multihierarchical multidisciplinary applications.

Multidisciplinary exchanges is therefore the key of this event, and PMA03 could thus be considered as what scientists call a "cutting-edges" event.

We do hope that the readers could clearly understand the importance of these multidisciplinary exchanges as an absolute key for advanced plant growth models and collaborative land use studies and applications.

We wish to express our deep gratitude to all members of Program Committee and reviewers who have worked hard to make the Symposium successful. We also wish to thank all authors and invited speakers for their valuable contributions to this international Symposium. We are grateful for all supports from different organizations.

Last, but not least, we would like to express many thanks to the local organisation committee from CAU and LIAMA in preparing the Symposium within a pleasant environment at the Fragrant Mountain Park. Finally, we hope that all participants will thoroughly enjoy the Symposium and Beijing.

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