# Preface

The 8th Mathematical Society of Japan International Research Institute "Computational Commutative Algebra and Combinatorics" was held in Osaka University, Toyonaka Campus, Osaka, Japan, July 21 – July 30, 1999. The organizing committee consisted of Jürgen Herzog, Takayuki Hibi and Richard Stanley. The present volume fills the role of the proceedings of the meeting.

The meeting was devoted to informing participants of recent progress and to stimulating new research in the computational aspects of combinatorics, commutative algebra, and related fields. Topics discussed included *Hilbert functions, generic initial ideals, Gröbner bases, algebraic shifting, toric varieties, convex polytopes, triangulations, and partially ordered sets*. More than a hundred participants, including 26 international participants from Bulgaria, Canada, Germany, India, Sweden, US, and Vietnam, attended the meeting.

Part I of the meeting, July 21 – 24, consisted of expository lecture series for graduate students given by the five speakers, Jürgen Herzog, Gil Kalai, Claudio Procesi, Vasudevan Srinivas, and Richard Stanley. Each speaker gave three one-hour lectures. Part II of the meeting, July 26 – 30, consisted of 22 one-hour invited research talks.

The fascinating research area "combinatorics and commutative algebra" originates from a pioneered work by Richard Stanley in 1975 on a proof of the Upper Bound Conjecture for spheres by means of the theory of Cohen–Macaulay rings. Since 1980, the geometry of toric variety has played important roles to develop combinatorics on convex polytopes. Moreover, in the early 90's, the technique on Gröbner bases turned out to be indispensable to study discrete structures on convex polytopes.

In Japan, there had been two international conferences on commutative algebra and combinatorics in the past; the US–Japan joint seminar on commutative algebra and combinatorics, Kyoto, 1985, and the ICM 90 satellite conference on commutative algebra and combinatorics, Nagoya, 1990. The proceedings of the first one were published in this series of the Advanced Studies in Pure Mathematics (volume 11, "Commutative Algebra and Combinatorics" (H. Matsumura and M. Nagata, Eds.), 1987). We hope the present volume will stimulate further developments in the computational aspects of combinatorics and commutative algebra.

We wish to thank the Mathematical society of Japan for choosing our research plan to be the topic of 1999 International Research Institute

and to thank the Japanese Associations of Mathematical Sciences for financial support to invite young researchers from several countries.

*All papers in this volume have been refereed and are in final form. No version of any of them will be submitted for publication elsewhere.*