Preface

This volume is a collection of 19 research and survey papers written by the speakers of the two international conferences:

1. "Combinatorial Methods in Representation Theory" (from July 21 to July 31, 1998), and

2. "Interaction of Combinatorics and Representation Theory" (from October 26 to November 6, 1998).

These conferences were held at RIMS (Research Institute for Mathematical Sciences, Kyoto University), as part of the Research Project of RIMS on "Combinatorial Methods in Representation Theory" for the academic year 1998–99. We had two visiting professors (John Stembridge from University of Michigan and Bernard Leclerc from Université de Caen) and 25 invited speakers from abroad during that period.

This field, which is developed by the interactions of Combinatorics and Representation Theory, is old and new. From the origin of the representation theory (A. Young, I. Schur, H. Weyl etc.), the study of the representations of specific groups and algebras inevitably incurred the combinatorial problems to be conquered. From the viewpoints of combinatorics, the combinatorial objects or structure occurring in this manner have interesting properties and beautiful symmetries in their own right. Since representation theory has strong wings, such as cohomology theory, harmonic analysis and algebraic geometry, it can fly up to the higher sky without any help of combinatorics. But if we stick to the down-to-earth calculations, which we believe to be essential in mathematics, we need to study their combinatorial aspects.

This volume contains such kinds of interesting papers and surveys stemming from representation theory, namely they treat representations of (affine) Hecke algebras and affine Lie algebras, combinatorial properties of Kazhdan-Lusztig polynomials, crystals and Gelfand-Zetlin bases for Lie (super) algebras, etc.

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Last but not least, we would like to express our hearty gratitude to Ms. Kazuko Suenaga and other secretaries in RIMS for their devoted