

## Preface

The conference “Representation Theory of Algebraic Groups and Quantum Groups” was held at Sophia University in Tokyo from August 1 to 10, 2001, as the 10th International Research Institute of the Mathematical Society of Japan (MSJ-IRI).

During the conference, there were 29 lectures by invited speakers, including a series of survey lectures by Seok-Jin Kang, Hiraku Nakajima, George Lusztig, Olivier Mathieu and Jens Carsten Jantzen. There were 173 participants including 59 from overseas. A lot of young researchers from 14 countries attended the conference, from Australia, Canada, Chile, China, Denmark, France, Germany, Japan, Korea, the Netherlands, Switzerland, Russia, the United Kingdom and the United States.

The conference was planned to focus on recent developments in the representation theory of algebraic groups and quantum groups. The topics covered modular representations of algebraic groups, representations of quantum groups and crystal bases, representations of affine Lie algebras, representations of affine Hecke algebras, modular or ordinary representations of finite Chevalley groups, representations of complex reflection groups and associated Hecke algebras.

There had been an international conference in 1983 at Kyoto on “Algebraic groups and related topics”. It was twenty years ago, and some of our invited speakers also participated in the Kyoto’s conference. Since then, the discovery of quantum groups by Drinfel’d and Jimbo in 1980’s has brought a drastic change to the representation theory of algebraic groups. The representation theory of quantum groups grew up quickly to be one of the main themes in the representation theory of Lie type. In addition to its own interest, it became noticed that the representation theory of quantum groups produces a striking bridge connecting various seemingly unrelated subjects, such as the modular representation theory of algebraic groups and the representation theory of affine Lie algebras. At present, the interactions between those theories are getting tight, and active researches are being done involving the representation theory of Hecke algebras, from geometric and combinatorial point of view.

In organizing the conference, we intended to summarize the present state of various representation theories through the talks by leading experts, and to give a chance for young researchers to be in touch with latest results by those experts. We believe that our aim was achieved well, and the conference became really exciting.

The present volume is the Proceedings of the conference. It contains 17 articles (plus one appendix) contributed by the invited speakers of the conference. Some of them are expository papers, which will give nice perspectives on those subjects for readers.

The study of algebraic groups in Japan was initiated by Professor Nagayoshi Iwahori. The Iwahori-Hecke algebra introduced by him turned out to be a fundamental tool, not only in the representation theory of algebraic groups, but also in wider areas such as knot theory and mathematical physics. He made a remarkable influence on the growth of the representation theory in Japan, and a lot of researchers in Japan nowadays benefited much from him. It is our pleasure to thank Professor Iwahori for such a big contribution to this area.

We express our hearty thanks to all the invited speakers for their interesting and stimulating talks, and to all the participants for their interests to the conference.

We would like to thank the Mathematical Society of Japan for their financial support for the conference. The conference was also supported by the Japan Association for Mathematical Sciences, and by the Grant-in-Aid for Scientific Research by Japan Society for the Promotion of Science. We thank them for their financial supports.

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*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.*