Preface

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Preface

Eiichi Bannai turned 60 on February 7th 2006 and we have prepared this special issue to celebrate the occasion.

Eiichi Bannai is one of the principal architects of the mathematical discipline known as algebraic combinatorics. The research area started gradually, taking its present form in the middle of the 1970's during the efforts culminating in the complete classification of finite simple groups. At that time Eiichi, being a finite group theorist, was looking for new concepts and objects in Schur's mathematics to expand some ideas and methods accumulated during the classification, hoping to achieve a better understanding of the nature of finite symmetries. The foundation of the discipline was laid in the Bannai-Ito book 'Algebraic Combinatorics I', published in 1984, which put the class of P- and Q-polynomial schemes at the forefront of research. It suggested that we should study the association schemes that possess a metric (P-polynomial) structure as well as its dual version (Q-polynomial structure) introduced by P. Delsarte in the early 70's to formulate t-designs as the dual of e-codes. This class of association schemes not only unified earlier seemingly scattered results in various areas including finite group theory, combinatorics, orthogonal polynomials and others, but also gave a long lasting direction for further research in these areas.

Algebraic combinatorics is often called 'group theory without groups', accommodating a wider range of mathematical symmetries. This area has developed beyond the class of P- and Q-polynomial schemes, more rapidly than one might have expected when Eiichi worked out a blueprint for the foundation, interacting with many other branches of mathematics such as low dimensional topology, mathematical physics, lattices, modular forms, operator algebras and random walks. With his numerous students and collaborators, Eiichi continues to amaze us by revealing new realms in the area of algebraic combinatorics.

This volume consists of 12 articles, each of which is closely related to Eiichi's research. These articles were selected to give a cross-section of the variety and the depth algebraic combinatorics aims for.

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