
Preface

The theory of Eisenstein series, in the general form given to it by Robert Langlands some forty years ago, has been an important and incredibly useful tool in the fields of automorphic forms, representation theory, number theory and arithmetic geometry. For example, the theory of automorphic L -functions arises out of the calculation of the constant terms of Eisenstein series along parabolic subgroups. Not surprisingly, the two primary approaches to the analytic properties of automorphic L -functions, namely the Langlands–Shahidi method and the Rankin–Selberg method, both rely on the theory of Eisenstein series. In representation theory, Eisenstein series were originally studied by Langlands in order to give the spectral decomposition of the space of L^2 -functions of locally symmetric spaces attached to adelic groups. This spectral theory has been used to prove the unitarity of certain local representations. Finally, on the more arithmetic side, the Fourier coefficients of Eisenstein series contain a wealth of arithmetic information which is far from being completely understood. The p -divisibility properties of these coefficients, for example, are instrumental in the construction of p -adic L -functions.

In short, the theory of Eisenstein series seems to have, hidden within it, an inexhaustible number of treasures waiting to be discovered and mined.

With such diverse applications, it is not easy even for the conscientious researcher to keep abreast of current developments. Indeed, different users of Eisenstein series often focus on different aspects of the theory. With this in mind, the workshop “Eisenstein Series and Applications” was held at the American Institute of Mathematics (Palo Alto) from August 15 to 19, 2005. The goal of the workshop was to bring together users of Eisenstein series from different areas who do not normally interact with each other, with the hope that such a juxtaposition of perspectives would provide deeper insight into the arithmetic of Eisenstein series and foster fruitful new collaborations.

This volume contains a collection of articles related to the theme of the workshop. Some, but not all of them, are based on lectures given in the workshop. We hope that the articles assembled here will be useful to a diverse audience and especially to students who are just entering the field.

We would like to take this opportunity to thank all the participants of the workshop for their enthusiastic participation, and the authors who contributed articles to this volume for their efforts and timely submissions, as well as, all the referees who gave the articles their thoughtful considerations. We are grateful to the American Institute of Mathematics and the National Science Foundation for providing generous support, and especially to Brian Conrey, David Farmer and Helen Moore of AIM for their invaluable assistance in the organization of the workshop.

We find it appropriate to dedicate this volume to Robert Langlands, who started it all, on the occasion of his seventieth birthday.

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