

Foreword

The Editorial Board for the articles in the mathematical sciences section consisted of G. Misra, R. Mukherjee, R. Sujatha and myself. We decided to seek articles on the following broad themes: mathematical analysis, probability and statistics, number theory, the theory of Lie and algebraic groups, and algebraic geometry. The authors were requested to contribute articles accessible to a broad scientific audience, reflecting some current trends in the area. The choice of topics and authors was made taking into account that the chosen area was one where Indians had made some contribution. The authors whom we approached all responded with interesting articles, written in individual styles. The Editors, and the readers of this volume, have reason to be grateful to them for their splendid efforts.

Here is a brief introduction to the individual articles in the mathematical sciences section. The article *Mathematical analysis in India* by **V S Sunder**, as well as *Partial differential equations*, by **M Vanninathan**, are on the theme of mathematical analysis. This theme actually covers many areas of mathematics, and the two articles touch on three of them: functional analysis, harmonic analysis and partial differential equations, with the latter having overlaps with applications of mathematics.

K R Parthasarathy has contributed an incisive write up entitled *Some highlights on probability theory in India during 1980–2008: A report*. Though it is a relatively short article, the interested reader will find it very informative on this topic. The article *Mathematics and computing* by **Ravi Kannan** is on Algorithms, a theme which straddles mathematics, computer science and applications. He argues through well-chosen examples (including works of Karmarkar, Manindra Agarwal, and Motwane, Madhu Sudan *et al.* as well as his own work) that the study and understanding of Algorithms, even in situations of practical interest,

is closely interrelated with more ‘abstract’ mathematics, leading to a fruitful two-way interaction between mathematics and computer science, of benefit to both disciplines.

The article *Lie groups and algebraic groups* by **M S Raghunathan** and **T N Venkataramana** surveys these fields, seen from the perspective of the substantial work done by Indian mathematicians in these areas. The article explains, in particular, various important concepts and problems in terms which would make sense to readers with relatively limited mathematical background, though the solutions would involve mathematics of a very high level which is less accessible to those without substantial training.

M S Narasimhan, in *Algebraic geometry in India*, gives a relatively short but very informative survey of the Indian contributions to algebraic geometry, a field in which Indians have made a mark, beginning with the famous works of Narasimhan himself, and C. S. Seshadri. The article on number theory, *The Sato-Tate conjectures* has been coauthored by **Ram Murty** and **V Kumar Murty**. Unlike the remaining articles, which have broader themes, their article focuses on the solution of a specific difficult and important problem, the proof of the ‘Sato-Tate conjecture’ by Richard Taylor. The authors have themselves made contributions to the study of this problem over the years, and in their article, give a brilliant and lucid exposition of the solution, which uses many different tools, the range of which would be beyond the expertise of most mathematicians. As such, the authors have made this important problem and its solution more accessible to the mathematical community, and interested Indian readers.

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