

Preface

Nonlinearity is pervasive in the description of all natural phenomena. The underlying dynamical description leads to very many novel concepts, including integrable systems, solitons, bifurcations, chaos, complexity, patterns and so on. A workshop on 'Nonlinear Integrable Systems and their Applications' was organized during February 24–March 1, 2014 at the Centre for Nonlinear Dynamics, School of Physics, Bharathidasan University, Tiruchirappalli. The meeting was organized as one of the five activities under the year-long programme of National Mathematics Initiative (NMI) by the Indian Institute of Science (IISc), Bengaluru on Integrable Systems. The main focus of this workshop was on the integrability aspects of both finite-dimensional and continuum nonlinear dynamical systems, modelled by difference, ordinary and partial differential equations and their applications in diverse areas such as hydrodynamics, nonlinear optics, magnetism, spintronics, field theory, quantum systems, and Bose–Einstein condensates. About 20 experts from within the country and abroad delivered lectures on various theoretical aspects of nonlinear integrable systems and their applications.

This issue brings out a collection of articles on nonlinear integrable systems and their applications. The first nine articles provide critical reviews on the basic theory and analytical methods of solutions applicable to nonlinear ordinary and partial difference and differential equations of contemporary interest. The remaining nine articles focus on the progress made in the applications of the concepts of integrable nonlinear systems including solitons in diverse areas of physics, biology and engineering. We do hope that the reviews and articles explaining the state-of-the-art of the various topics will provide impetus to make further progress in the field.

It is a pleasure to thank Prof. G Rangarajan for providing all support to organize the meeting under the NMI activities of the Department of Mathematics, IISc and encouraging us to go ahead with the publication of the Proceedings of the Workshop. We are especially thankful to the Editorial Board, in particular Prof. Rohini Godbole, of *Pramana – J. Phys.* for their enthusiastic support in bringing out this special issue. We are also grateful to all the referees and authors for their timely cooperation.

M Lakshmanan

P Muruganandam

Bharathidasan University, Tiruchirappalli 620 024, India

(Editors)