Preface

This volume is devoted to the Proceedings of the Second Conference on Symmetries, Differential Equations and Applications. The first in the series, held at the University of the Witwatersrand, Johannesburg, South Africa in January 2012 had been named (with exceptional foresight) the *first* Conference on Symmetries, Differential Equations and Applications, SDEA-I. It had then been decided to hold a second (hence the “First” in the name) conference and to shift the venue to either Turkey or Pakistan. Since Turkey was already involved in arranging a large number of international conferences in Mathematics, it devolved on Pakistan to hold the second. The first one was held on the bicentennial of the birth of Evariste Galois and was dedicated to him. The organizers were Fazal Mahomed, David Mason and Kevin Periera of Wits, South Africa with Mehmet Pakdemirli of Turkey and Asghar Qadir of Pakistan added as the international members. The Conference was of a very good standard and its proceedings, edited by F.M. Mahomed, M. Pakdemirli and A. Qadir, were published in the Journal of Applied Mathematics.

The venue for SDEA-II was decided as the National University of Sciences and Technology, Islamabad. The intention had been that the series be held roughly every second year. Since the convenient time for most people, on account of winter (in the North) or summer (in the South) vacations being January, it was decided to hold it precisely two years later, in January 2014. The first one having been dedicated to Galois, we needed to see what possibilities were available for the year 2014. It turned out that this was the sesquicentennial of Maxwell’s theory of electromagnetism. Not that the paper was published in that year but that it was presented to the Royal Society of London in 1864. Since David Mason (who is Scottish) and Asghar Qadir are both great admirers of Maxwell and his work, the former was to present the dedication talk at the Conference, with help from the latter. Unfortunately, he got ill and was unable to travel for the Conference, so the latter presented the talk. Nevertheless, both have contributed to writing the paper for the Proceedings and it appears at the start.

The original advertisement for the areas to be covered included, but were not limited to: Lie theory in approximate and complex differential equations; Noether symmetries and their extensions; methods for first integrals and conservation laws; linearization; stochastic differential equations; geometrical flows; moving coframe formalism; classical mechanics, continuum mechanics and general relativity; equations of finance; bi-Hamiltonian formalism. Of course, it was not expected that we

get all of these covered, nor were they. Apart from the dedication paper there were ten more, listed in the contents given next. Following the same spirit of SDEA-I all conference contributions went under peer and double blind review process. We are most grateful to all the authors for their work in preparing the manuscripts for these proceedings, to the reviewers for their very thorough refereeing and back to the authors for further efforts to incorporate the modifications required. We express our special thanks to the English Editor, Rabiya Asghar Qadir, for her work in checking through the English.

We are also very grateful to the School of Natural Sciences (SNS) for its incredible support especially Prof. Azad A Siddiqui (Principal) for his continuous efforts and encouragement. We would like to express our gratitude to the NUST University for key infrastructural support, to the Commission for Science and Technology (COMSTECH) of the Organization of Islamic Countries, to the Pakistan Academy of Sciences, to the Higher Education Commission of Pakistan and to the Pakistan Science Foundation for generous support. The National Center for Physics (NCP), Pakistan is also acknowledged for providing hospitality to the local participants.

Sajid Ali
(*NUST University, Pakistan*)

Fazal M Mahomed
(*University of Witwatersrand, South Africa*)

Asghar Qadir
(*NUST University, Pakistan*)

Proceedings of the International Conference
Symmetries, Differential Equations and Applications
Islamabad, Pakistan, January 27–30, 2014

Commemorating the sesquicentennial of the presentation by J C Maxwell
“A Dynamical Theory of the Electromagnetic Field”
to the Royal Society of London, 1864.

The proceedings of the first International Conference *Symmetries, Differential Equations and Applications (SDEA-II)* appeared as a special issue in the Journal of Applied Mathematics (JAM) in 2013. The first conference in the series commemorated the bicentenary of the birth of Évariste Galois who introduced the notion of a group and made fundamental contributions to the solution of polynomial equations. This conference was second in the series and dedicated to the presentation of J. C. Maxwell of his theory of electromagnetism to the Royal Society of London in 1864.

Proceedings of the International Conference
Symmetries, Differential Equations and Applications
Islamabad, Pakistan, January 27–30, 2014

SDEA – II

Editors

Sajid Ali (Pakistan)

Fazal M. Mahomed (South Africa)

Asghar Qadir (Pakistan)

Sponsors

Higher Education Commission Pakistan (HEC)

Pakistan Academy of Sciences (PAS)

NUST University

International Mathematical Union (IMU)

International Center for Theoretical Physics (ICTP)

Pakistan Science Foundation (PSF)

National Center for Physics (NCP)