Preface

**Armengol Gasull · Julia Hartmann ·
Jaume Llibre · Sebastian Walcher**

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In December 2010 a mini-workshop on Algebraic and Analytic Techniques for Polynomial Vector Fields was held at Mathematisches Forschungsinstitut Oberwolfach. This interdisciplinary workshop brought together researchers from various areas of algebra and analysis who work on topics related to polynomial vector fields. Several participants had not met in person prior to the workshop, and most were not familiar with all research topics presented. Each participant was asked to give a survey talk about her or his particular research area, accessible to all participants. Ample time and opportunity was given, during the talks and afterwards, to questions and discussion. Moreover, there several informal problem sessions were held during the week.

All participants took great care in preparing and presenting their talks and made a strong effort to keep them accessible to a general audience while at the same time reporting interesting recent developments. Even during the workshop one could see successful interaction as participants were suggesting new approaches to or applications of the results presented in the talks. Since many of the speakers had prepared rather detailed written versions of their presentations, the organizers suggested writing longer versions of these presentations for inclusion in the present special issue of

A. Gasull · J. Llibre (✉)
Departament de Matemàtiques, Universitat Autònoma de Barcelona,
08193 Bellaterra, Barcelona, Spain
e-mail: jllibre@mat.uab.cat

A. Gasull
e-mail: gasull@mat.uab.cat

J. Hartmann · S. Walcher
Lehrstuhl A für Mathematik, RWTH Aachen, 52056 Aachen, Germany
e-mail: hartmann@matha.rwth-aachen.de

S. Walcher
e-mail: walcher@mathA.rwth.aachen.de

QTDS. While some contributors used this opportunity for extended surveys, others decided to include new and yet unpublished results in these longer versions.

The collection of the papers in this volume reflects the interdisciplinary character of the meeting and the wide range of topics. In addition to contributions relating to Hilbert's 16th problem from various perspectives, topics include invariant sets and Darboux integrability, Lie's classical theory of transformation groups in a modern framework, and new developments in algorithmic invariant theory which promise to make symmetry reduction feasible in a wider range of applications. The total number of papers related to the mini-workshop in QTDS is likely to increase, because a few more contributions are yet to be submitted for regular issues.

We hope that the reader will enjoy the present collection of papers, both as a useful reference and as a source of research topics, reflecting a successful workshop that all participants enjoyed.

The organizers:

Armengol Gasull

Julia Hartmann

Jaume Llibre

Sebastian Walcher