Harm Derksen • Gregor Kemper

Computational Invariant Theory

Second Enlarged Edition with two Appendices by
Vladimir L. Popov, and an Addendum by
Norbert A. Campo and Vladimir L. Popov

Springer

Preface to the Second Edition

It is more than 10 years ago that the first edition of this book has appeared. Since then, the field of computational invariant theory has been enjoying a lot of attention and activity, resulting in some important and, to us, exciting developments. This is why we think that it is time for a second enlarged and revised edition. Apart from correcting some mistakes and reorganizing the presentation here and there, we have added the following material: further results about separating invariants and their computation (Sects. 2.4 and 4.9.1), Symonds' degree bound (Sect. 3.3.2), Hughes' and Kemper's extension of Molien's formula (Sect. 3.4.2), King's algorithm for computing fundamental invariants (Sect. 3.8.2), Broer's criterion for the quasi-Gorenstein property (Sect. 3.9.11), Dufresne's generalization of Serre's result on polynomial invariant rings and her result with Jeffries (Sect. 3.12.2), Kamke's algorithm for computing invariants of finite groups acting on algebras (Sect. 3.13), Kemper's and Derksen's algorithm for computing invariants of reductive groups in positive characteristic (Sect. 3.13), algorithms by Müller-Quade and Beth, Hubert and Kogan, and Kamke and Kemper for computing invariant fields and localizations of invariant rings (Sect. 4.10.1), and work by van den Essen, Freudenburg, Greuel and Pfister, Kemper, Sancho de Salas, and Tanimoto on invariants of the additive group and of connected solvable groups (Sect. 4.10.5).

Last but not least, this edition contains two new appendices, written by Vladimir Popov, on algorithms for deciding the containment of orbit closures and on a stratification of Hilbert's nullcone. The second appendix has an addendum, authored by Norbert A'Campo and Vladimir Popov, containing the source code of a program for computing this stratification.

We would like to thank Bram Broer, Emilie Dufresne, Vladimir Popov, Jim Shank, and Peter Symonds for valuable comments on a pre-circulated version of this edition, Vladimir Popov and Norbert A'Campo for their contributions to the

book, and Ruth Allewelt at Springer-Verlag for managing the production process and for gently pushing us to finally finish our work and hand over the files.

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