
Preface

The two fields of Geometric Modeling and Algebraic Geometry, though closely related, are traditionally represented by two almost disjoint scientific communities. Both fields deal with objects defined by algebraic equations, but the objects are studied in different ways. While algebraic geometry has developed impressive results for understanding the theoretical nature of these objects, geometric modeling focuses on practical applications of virtual shapes defined by algebraic equations. Recently, however, interaction between the two fields has stimulated new research. For instance, algorithms for solving intersection problems have benefited from contributions from the algebraic side.

The workshop series on Algebraic Geometry and Geometric Modeling (Vilnius 2002¹, Nice 2004²) and on Computational Methods for Algebraic Spline Surfaces (Kefermarkt 2003³, Oslo 2005) have provided a forum for the interaction between the two fields. The present volume presents revised papers which have grown out of the 2005 Oslo workshop, which was aligned with the final review of the European project GAIA II, entitled *Intersection algorithms for geometry based IT-applications using approximate algebraic methods* (IST 2001-35512)⁴.

It consists of 12 chapters, which are organized in 3 parts. The first part describes the aims and the results of the GAIA II project. Part 2 consists of 5 chapters covering results about special algebraic surfaces, such as Steiner surfaces, surfaces with many real singularities, monoid hypersurfaces, canal surfaces, and tensor-product surfaces of bidegree (1,2). The third part describes various algorithms for geometric computing. This includes chapters on parameterization, computation and analysis of ridges and umbilical points, surface-surface intersections, topology analysis and approximate implicitization.

¹ R. Goldman and R. Krasauskas, *Topics in Algebraic Geometry and Geometric Modeling*, Contemporary Mathematics, American Mathematical Society 2003.

² M. Elkadi, B. Mourrain and R. Piene, *Algebraic Geometry and Geometric Modeling*, Springer 2006.

³ T. Dokken and B. Jüttler, *Computational Methods for Algebraic Spline Surfaces*, Springer 2005.

⁴ <http://www.sintef.no/IST-GAIA>

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