Automated Deduction in Geometry

Second International Workshop, ADG’98
Beijing, China, August 1-3, 1998
Proceedings
Preface

The Second International Workshop on Automated Deduction in Geometry (ADG ’98) was held in Beijing, China, August 1–3, 1998. An increase of interest in ADG ’98 over the previous workshop ADG ’96 is represented by the notable number of more than 40 participants from ten countries and the strong technical program of 25 presentations, of which two one-hour invited talks were given by Professors Wen-tsün Wu and Jing-Zhong Zhang. The workshop provided the participants with a well-focused forum for effective exchange of new ideas and timely report of research progress. Insight surveys, algorithmic developments, and applications in CAGD/CAD and computer vision presented by active researchers, together with geometry software demos, shed light on the features of this second workshop. ADG ’98 was hosted by the Mathematics Mechanization Research Center (MMRC) with financial support from the Chinese Academy of Sciences and the French National Center for Scientific Research (CNRS), and was organized by the three co-editors of this proceedings volume.

The papers contained in the volume were selected, under a strict refereeing procedure, from those presented at ADG ’98 and submitted afterwards. Most of the 14 accepted papers were carefully revised and some of the revised versions were checked again by external reviewers. We hope that these papers cover some of the most recent and significant research results and developments and reflect the current state-of-the-art of ADG.

We want to thank all those members of MMRC who contributed to the local organization of ADG ’98 and the referees for their time and help. We also want to acknowledge some of the previous workshops and conferences and the corresponding publications listed below which have stimulated the continuing activities on ADG.


VI  Preface


July 1999

Xiao-Shan Gao
Dongming Wang
Lu Yang
# Table of Contents

Automatic Geometry Theorem-Proving and Automatic Geometry Problem-Solving 1  
Wen-tsün Wu  

Solving Geometric Problems with Real Quantifier Elimination 14  
Andreas Dolzmann  

Automated Discovering and Proving for Geometric Inequalities 30  
Lu Yang, Xiaorong Hou, and Bican Xia  

Proving Newton’s Propositio Kepleriana Using Geometry and Nonstandard Analysis in Isabelle 47  
Jacques D. Fleuriot and Lawrence C. Paulson  

Readable Machine Solving in Geometry and ICAI Software MSG 67  
Chuan-Zhong Li and Jing-Zhong Zhang  

Plane Euclidean Reasoning 86  
Desmond Fearnley-Sander  

A Clifford Algebraic Method for Geometric Reasoning 111  
Haiquan Yang, Shugong Zhang, and Guochen Feng  

Clifford Term Rewriting for Geometric Reasoning in 3D 130  
Thierry Boy de la Tour, Stéphane Fèvre, and Dongming Wang  

Some Applications of Clifford Algebra to Geometries 156  
Hongbo Li  

Decomposing Algebraic Varieties 180  
Dongming Wang  

An Application of Automatic Theorem Proving in Computer Vision 207  
Didier Bondyfalat, Bernard Mourrain, and Théodore Papadopoulos  

Automated Geometry Diagram Construction and Engineering Geometry 232  
Xiao-Shan Gao  

A 2D Geometric Constraint Solver for Parametric Design Using Graph Analysis and Reduction 258  
Jae Yeol Lee  

Variant Geometry Analysis and Synthesis in Mechanical CAD 275  
Zongying Ou and Jun Liu  

Author Index 287