Foreword

Over the past decades, we have seen a slow, but steady popularization of automatic verification technology — once the Holy Grail of formal methods in computer science — that is indicative of the maturity the field has achieved. Only few universities do still hesitate to expose undergraduates to the field's basic methods, the pertinent tools, and their underlying algorithms, and industrial takeover is undeniably gaining impetus, following education with the natural phase delay. Over the years, some basic techniques have become cornerstones of the field, forming identifiable and reappearing building blocks of the plethora of tools that have been built. Among these fundamentals are abstract interpretation, binary decision diagrams, and satisfiability solving, to name just a few. Within this book, you will find an informed account of a number of substantial contributions to the latter field, in particular addressing the domain of satisfiability modulo theories, which has become instrumental to various mechanic verification schemes in hardware and software validation. Despite being based on a PhD thesis, which I had the pleasure to advise, the book elaborates in equal detail on the underlying "folklore" ideas and techniques and on the author's own contributions, complementing both by extensive pointers to open problems and ideas for further research. I hope you as a reader will find it helpful, no matter whether you are a novice trying to understand satisfiability solving for complex-structured arithmetic constraints or are an expert looking for a clear-cut delineation of the techniques developed in the *Transregional Collaborative Research Center AVACS* (Automatic Verification and Analysis of Complex Systems, funded by the Deutsche Forschungsgemeinschaft) from competing approaches.

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