

Better Answers to Real Questions

Marek Košta¹, Thomas Sturm¹ and Andreas Dolzmann²

¹ Max-Planck-Institut für Informatik, 66123 Saarbrücken, Germany
`mkosta@mpi-inf.mpg.de`, `sturm@mpi-inf.mpg.de`

² Leibniz-Zentrum für Informatik, 66041 Saarbrücken, Germany
`andreas.dolzmann@dagstuhl.de`

Abstract

We consider existential problems over the reals. Extended quantifier elimination generalizes the concept of regular quantifier elimination by providing in addition answers, which are descriptions of possible assignments for the quantified variables. Implementations of extended quantifier elimination via virtual substitution have been successfully applied to various problems in science and engineering. So far, the answers produced by these implementations included infinitesimal and infinite numbers, which are hard to interpret in practice. We introduce here a post-processing procedure to convert, for fixed parameters, all answers into standard real numbers. The relevance of our procedure is demonstrated by applications of our implementation to various examples from the literature, where it significantly improves the quality of the results.