On proving inequalities by cylindrical algebraic decomposition. (English) Zbl 1474.68466

Summary: Cylindrical algebraic decomposition (CAD) is a basic concept in real algebraic geometry, and it has useful applications to deal with symbolic inequalities. We present a new implementation of CAD in the SageMath computer algebra system. This is not as fast as some existing implementations like QEPCAD, but it is more exible to be embedded in certain larger calculations. One such application of CAD is a proving procedure for inequalities involving recursive functions, invented by S. Gerhold and M. Kauers [in: Proceedings of the 2005 international symposium on symbolic and algebraic computation, ISSAC’05. New York, NY: ACM Press. 156–162 (2005; Zbl 1360.68933)]. We present an implementation of this algorithm as well. This paper also gives an overview with examples about the theory behind the implemented algorithms.

MSC:
68W30 Symbolic computation and algebraic computation
14Q30 Computational real algebraic geometry

Keywords:
cylindrical algebraic decomposition; inequalities; Sage package

Software:
QEPCAD; SageMath

Full Text: Link