A generic position based method for real root isolation of zero-dimensional polynomial systems. (English) Zbl 1304.13048

Real root isolation has many applications in mathematics, science and engineering. This problem has been studied for a long time using different methods like symbolic methods (Gröbner bases, characteristic sets and regular chains), numerical methods (approximate arithmetic) and symbolic-numeric methods. In the paper under review, the authors use generic position which is a geometric property of the roots of a polynomial system. A zero-dimensional bivariate system is said to be in a generic position if one can find a complex plane, say the x-axis, such that different complex zeros of the system are projected to different complex points on the complex x-axis. Generic position was used in the polynomial system solving by many authors including: Canny, Giusti, Heintz, Rouillier, Yokoyama and so on. In this paper, the authors improve the local generic position method for isolating the real roots of a zero-dimensional bivariate polynomial system with two polynomials and generalize it to general zero-dimensional polynomial systems. Based on resultant theory and this improvement they propose an algorithm for isolating the real roots of a zero-dimensional polynomial system. Their implementation of this algorithm shows that the method is efficient, especially for bivariate polynomial systems.

Reviewer: Amir Hashemi (Isfahan)

MSC:
13P05 Polynomials, factorization in commutative rings
68W30 Symbolic computation and algebraic computation

Keywords:
polynomial systems; real root isolation; linear univariate representation; generic position

Software:
Kronecker; Lgp; ISOLATE

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References:


