Modified Wilkinson's Polynomial 1

`wilkinson.1.30`

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Ring: $\mathbb{R}[x]$
Equations:

$$((x^{10}/10^{20} + (x-10)^2)\prod_{i=1}^{20}(x-i).$$

Polynomial obtained by multiplying Wilkinson's polynomial of degree 20 by a Mignotte-like polynomial having two roots close to 10. Supplied by D. A. Bini (Oct. 1996).

1 Characteristics

- rational coefficients
- Besides the ill conditioning of the integer roots, there is a cluster of two roots close to 10. The condition number of the root 10 is about 10^{26}.

2 Problem

Newton-isolate all the roots.

2.1 Solution

Algorithm based on simultaneous iterations (Aberth's method) with cluster analysis (see [**?**]).

Program in Fortran 90 based on the multiprecision package MPFUN, by D. Bailey.

Machine used: IBM Risc 6000.

Time for isolating all the roots: 12 seconds.

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References

[1] D. Bini. Numerical computation of polynomial zeros by means of aberth's method. *Numerical Algorithms*, 1997. (to appear).

[2] D. Bini and B. Mourrain. Polynomials test suite. 1996.