

Kaltofen, Erich L.

The “Seven Dwarfs” of symbolic computation. (English) [Zbl 1257.65013](#)

Langer, Ulrich (ed.) et al., Numerical and symbolic scientific computing. Progress and prospects. New York, NY: Springer (ISBN 978-3-7091-0793-5/pbk; 978-3-7091-0794-2/ebook). Texts & Monographs in Symbolic Computation, 95-104 (2012).

Summary: We present the Seven Dwarfs of symbolic computation, which are sequential and parallel algorithmic methods that today carry a great majority of all exact and hybrid symbolic compute cycles.

SymDwf 1. Exact linear algebra, integer lattices

SymDwf 2. Exact polynomial and differential algebra, Gröbner bases

SymDwf 3. Inverse symbolic problems, e.g. interpolation and parameterization

SymDwf 4. Tarskio’s algebraic theory of real geometry

SymDwf 5. Hybrid symbolic-numeric computation

SymDwf 6. Computation of closed form solutions

SymDwf 7. Rewrite rule systems and computational group theory

We elaborate on each dwarf and compare it with Colella’s seven and the Berkeley team’s thirteen dwarfs of scientific computing.

For the entire collection see [\[Zbl 1234.65014\]](#).

MSC:

[65D99](#) Numerical approximation and computational geometry (primarily algorithms)

[65Y05](#) Parallel numerical computation

[68W30](#) Symbolic computation and algebraic computation

[65F99](#) Numerical linear algebra

Keywords:

[symbolic computation](#); [parallel algorithmic methods](#); [linear algebra](#); [integer lattices](#); [polynomial and differential algebra](#); [Gröbner bases](#); [inverse symbolic problems](#); [interpolation](#); [parameterization](#); [Tarskio’s algebraic theory of real geometry](#); [hybrid symbolic-numeric computation](#); [closed form solutions](#); [computational group theory](#)

Software:

[SPIRAL](#); [RAGlib](#)

Full Text: [DOI](#)