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Algorithmic methods in non-commutative algebra. Applications to quantum groups. (English) [Zbl 1063.16054](#)

Mathematical Modelling: Theory and Applications 17. Dordrecht: Kluwer Academic Publishers (ISBN 1-4020-1402-3/hbk). xi, 298 p. (2003).

The aim of this monograph is to show that Gröbner bases techniques, which have been developed for polynomial rings $k[x_1, \dots, x_n]$ over a field k , can be applied to a vast class of sufficiently noncommutative rings, namely, the so-called Poincaré-Birkhoff-Witt rings. The monograph includes algorithms dealing with essential aspects like ideals and bimodules, the calculation of homological dimension, and of the Gelfand-Kirillov dimension, the Hilbert-Samuel polynomial, primality tests for prime ideals, etc.

Reviewer: [Hirokazu Nishimura \(Tsukuba\)](#)

MSC:

- [16Z05](#) Computational aspects of associative rings (general theory)
- [16P90](#) Growth rate, Gelfand-Kirillov dimension
- [16W35](#) Ring-theoretic aspects of quantum groups (MSC2000)
- [13P10](#) Gröbner bases; other bases for ideals and modules (e.g., Janet and border bases)
- [16S36](#) Ordinary and skew polynomial rings and semigroup rings
- [17B35](#) Universal enveloping (super)algebras
- [68W30](#) Symbolic computation and algebraic computation
- [17-08](#) Computational methods for problems pertaining to nonassociative rings and algebras

Cited in **37** Documents

Keywords:

[Gröbner bases](#); [Poincaré-Birkhoff-Witt rings](#); [Gelfand-Kirillov dimension](#)