

**Laurent, Monique**

**Sums of squares, moment matrices and optimization over polynomials.** (English)

Zbl 1163.13021

Putinar, Mihai (ed.) et al., Emerging applications of algebraic geometry. Papers of the IMA workshops Optimization and control, January 16–20, 2007 and Applications in biology, dynamics, and statistics, March 5–9, 2007, held at IMA, Minneapolis, MN, USA. New York, NY: Springer (ISBN 978-0-387-09685-8/hbk). The IMA Volumes in Mathematics and its Applications 149, 157-270 (2009).

The author considers the problem of minimizing a polynomial over a semialgebraic set defined by polynomial equations and inequalities. He presents these hierarchies of approximations and their main properties, and then reviews the mathematical tools underlying these properties. The paper contains sections of Positive polynomials and sums of squares; Moment sequences and moment matrices; Back to the polynomial optimization problem; Application to optimization and Exploiting algebraic structure to reduce the problem size.

For the entire collection see [Zbl 1151.14004].

Reviewer: [Yueh-er Kuo \(Knoxville\)](#)

**MSC:**

- 13P10 Gröbner bases; other bases for ideals and modules (e.g., Janet and border bases)
- 13J25 Ordered rings
- 14P10 Semialgebraic sets and related spaces
- 15A99 Basic linear algebra
- 90C22 Semidefinite programming
- 90C30 Nonlinear programming

Cited in **6** Reviews  
Cited in **177** Documents

**Keywords:**

[positive polynomial](#); [moment problem](#); [polynomial optimization](#); [semidefinite programming](#)

**Software:**

[GloptiPoly](#); [SDPA](#); [Sostools](#)