

Moments, positive polynomials and the Christoffel function

Jean B. Lasserre

LAAS-CNRS & Institute of Mathematics, Université de Toulouse
lasserre@laas.fr

In the first part of the talk we briefly describe the Moment-SOS hierarchy [1, 2], a methodology to solve the Generalized Moment Problem (GMP) with algebraic data, whose list of potential applications is almost endless, and global optimization being its simplest instance. In a second part we briefly consider the inverse problem of recovering the algebraic boundary of a basic semi-algebraic set from the sole knowledge of moments of the Lebesgue measure on the set [4]. Finally, the third part of the talk is devoted to the Christoffel function [3], a well-known tool in theory of approximation and orthogonal polynomials. We will describe how it nicely connects with the first two parts of the talk, in particular for recovering the graph of a function from moments of the measure supported on the graph, but also for its role in a key aspect of algorithmic polynomial optimization.

References

- [1] J. B. Lasserre. *Moments, Positive Polynomials and Their Applications*, Imperial College Press, London, UK, 2009.
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- [3] J. B. Lasserre, E. Pauwels, M. Putinar. *The Christoffel-Darboux Kernel for Data Analysis*, Cambridge University Press, Cambridge, UK, 2022.
- [4] J. B. Lasserre, M. Putinar. Algebraic-exponential Data Recovery from Moments, *Discrete & Comput. Geom.*, 54: 993–1012, 2015.