

# Effective bounds for compactness of semialgebraic sets defined over the rationals

JOEL HURTADO, CARLOS D'ANDREA

Facultat de Matemàtiques i Estadística, Universitat Politècnica de Catalunya

joel.hurtado@estudiantat.upc.edu

**Resumen.** Semialgebraic sets play a central role in real algebraic geometry, being the basic construction of this field. Many results around them such as Schmüdgen's Positivstellensatz [1] and numerous subsequent works, rely on the compactness of semialgebraic sets, a question that is not trivial to address from an algorithmic point of view.

We study this problem for polynomials in several variables with rational coefficients. Our aim is to determine the radius of a ball containing the semialgebraic set defined by the input in terms of the coefficients and degrees of them, following a similar approach as in [2].

We also present results relating positivity certificates for real multivariate polynomials and the property of archimedeanity of quadratic modules.

**Palabras clave:** Computational Algebraic Geometry; Semialgebraic sets; Compactness; Polynomials; Non-negativity certificates.

## Referencias

- [1] K. Schmüdgen (1991). The K-moment problem for compact semi-algebraic sets. *Math. Ann.* 289 (2), 203–206.
- [2] J. Gabriela, D. Perrucci, E. Tsigaridas (2013). On the minimum of a polynomial function on a basic closed semialgebraic set and applications. *SIAM J. Optim.* 23 (2013), no. 1, 241–255.

Indicar la preferencia (subrayar la opción elegida): póster o charla.

Indicar la preferencia (subrayar la opción elegida): Lunes/Martes o Jueves/Viernes.