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Une borne géométrique pour la programmation entière à contraintes polynomiales. (French. English summary) [A geometrical bound for integer programming with polynomial constraints]

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This paper establishes a geometrical bound on the integer solution of a system of the form $F_1 \leq 0, \cdots, F_s \leq 0$, where F_i are quasiconvex polynomials on $\mathbf{R}^n$, of degree $d \geq 2$, with integer coefficients. More specifically, it is proved that the system admits an integer solution if and only if there exists an integer solution in the ball centered at the origin with radius $(sd)^{n^c}\sigma$, where σ is an upper bound on the binary length of the coefficients and c is a constant independent of n, s, d and σ.

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Let $F_1, ..., F_s \in \mathbb{Z}[X_1, ..., X_n]$ be quasiconvex polynomials of degree bounded by $d \geq 2$. Let σ be an upper bound for the binary length of their coefficients. We show that the system $F_1 \leq 0, ..., F_s \leq 0$ admits an integer solution iff such a solution with binary length bounded by $(sd)^{n^c} \cdot \sigma$ exists (where c is a constant, independent of n, s, d and σ). The simply exponential feature of our bound is intrinsic of this problem.

Keywords : quasiconvex polynomials; binary length; bound

Classification :

$*$90C10 Integer programming

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