

Asimptotics of the volume function for some semialgebraic sets in \mathbb{R}^n

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ABSTRACT

It is investigated the volume function $V(\rho)$ for the set

$$\Phi_\rho = \{x \in \mathbb{R}^n : f(x) < \rho\},$$

with a polynomial function $f(x)$. For the elliptic polynomial f the function $V(\rho)$ can be represented as Laurent–Puiseux series

$$V(\rho) = \sum_{j=0}^{\infty} k_j \rho^{\frac{n-j}{d}}.$$

This series converges for large ρ , and the leading coefficient k_0 is expressed by the integral of a rational function over \mathbb{R}^n and therefore is a hypergeometric function with respect of variable coefficients of f . In two dimensional case ($n = 2$) the function $V(\rho)$ is studied for arbitrary polynomial f .

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