Математическое и компьютерное моделирование:
материалы III Международной научной конференции
(Омск, 12 ноября 2015 г.). Омск, 2015. С. 136. UDC 510.5

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ONCE WE KNOW THAT A POLYNOMIAL MAPPING IS RECTIFIABLE, WE CAN ALGORITHMICALLY FIND A RECTIFICATION

It is known that some polynomial mappings $\varphi : \mathbb{C}^k \to \mathbb{C}^n$ are *rectifiable* in the sense that there exists a polynomial mapping $\alpha : \mathbb{C}^n \to \mathbb{C}^n$ whose inverse is also polynomial and for which $\alpha(\varphi(z_1, \ldots, z_k)) = (z_1, \ldots, z_k, 0, \ldots, 0)$ for all $z_1, \ldots, z_k$. In many cases, the existence of such a rectification is proven indirectly, without an explicit construction of the mapping α.

In this report, we use Tarski–Seidenberg algorithm (for deciding the first order theory of real numbers) to design an algorithm that, given a polynomial mapping $\varphi : \mathbb{C}^k \to \mathbb{C}^n$ which is known to be rectifiable, returns a polynomial mapping $\alpha : \mathbb{C}^n \to \mathbb{C}^n$ that rectifies φ.

The above general algorithm is not practical for large n, since its computation time grows faster than 2^{2^n}. To make computations more practically useful, for several important case, we have also designed a much faster alternative algorithm.