# MULTIDIMENSIONAL GENERALIZATION of CONTINUED FRACTIONS: HISTORY, MAIN RESULTS, NEW SENTURE PROBLEMS

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It was considered the first generalization of a continued fraction was done by L. Euler, but as it was noted by Genvei Nakane in 1728, the Japanese mathematician Katahiro Tekebe realized the first attempt to generalize the continued fraction solving a Diophantine inequality $\left|ax - by \pm c\right| < 1, a, b \in R_+, x, y \in Z$ . Euler's algorithm was generalized by Poincare, Jakobi, Dirichlet, Kronecker, Voronyi and Minkovsky, and all these algorithms were investigated by many mathematicians, in particular A.Chovanskii, O.Perron V.Brun, G. Szekeres.

The idea of the present generalization consists of the construction such multidimensional generalization of the continued fraction which will be a continued fraction analogy for function of several variables. The two-dimensional continued fraction

$$\mathop{D}_{i=0}^{\infty} \frac{a_{ii}}{b_{ii} + \Psi_i}, \Psi_i(\mathbf{z}) = \mathop{D}_{j=i+1}^{\infty} \frac{a_{ji}}{b_{ij}} + \mathop{D}_{j=i+1}^{\infty} \frac{a_{ij}}{b_{ij}},$$

where $a_{kj} \in \mathbf{C}$, $k \geq 0$, $j \geq 0$, $D$ means the symbol of the fraction was proposed in 1978[1].

We present an overview of the main results and indicate some current research themes that are under investigation. Our discussion includes:

- interpolation and approximation of multivariable functions [2];
- correspondence between a two-dimensional continued fraction and a double power series;
- convergence issues such as Worpitzky, Van Vleck, Śleszyński-Pringsheim type convergence theorems;
- the generalization of the g-fractions.

1. Kh.Yo. Kuchmins'ka, *Corresponding and associated continued fractions for double power series, Dopovidi AN URSR, ser. A, 7 (1978), 614-618 (in Ukrainian).*
2. D. Bodnar, Kh.Kuchmins'ka, O. Sus', *A survey of analytic theory of branched continued fractions, Communications Anal.Th.Cont.Fr., 2 (1993), 4-21.*