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DISCRETE ALGEBRAIC EQUATIONS AND DISCRETE OPERATOR EQUATIONS

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Abstract

Result shown in this paper is a grand breakthrough in constructive method of classical mathematics which take solving equations including to give formula solutions as one of its main tasks. It's considered impossible to give formula solutions to general transcendental equations and general operator equations. Huge difficult in this problem forces mathematics to develop into two directions which are topology and algebra. Topology gives up distance function and algebra limits itself in a narrow range of axioms of arithmetic which are satisfied by very few functions or operations so it's impossible to find formula solutions by ways supplied by topology and algebra. The basic thought in this paper comes from Hilbert 13^{th} problem solved in 50s of the last century existence result of which shows that any continued function $f(x_1, x_2, \cdots, x_M)$ defined on M-dimensional unit cube E_N can be expressed by superposition of functions of one variable. We give a constructive result that any discrete function of several variables can be expressed by superposition of functions of one variable so we give formula solutions to algebraic equations constructed by discrete functions. We introduce five special operators and give formula solutions to discrete algebraic equations containing parameterized discrete functions. We extend the result to discrete operator equations. These results are important to symbolic computation, functional analysis, differential equations.

Key Words : Mod N function, Commutation operator, Tension-compression operator, Superposition operator, Decomposition operator, Adding variables operator.

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