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A General Version of the Retract Method for Discrete Equations

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摘要

关键词 Discrete equation Consequent point Retract

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Abstract In this paper we study a problem concerning the compulsory behavior of solutions of systems of discrete equations $u(k+1)=F(k,u(k))$, $k=a,a+1,a+2,\dots$, $\,a\in {\Bbb{N}}$, ${\Bbb{N}}=\{0,1,\dots \}$ and $F: N(a)\times {\Bbb{R}}^n\to{\Bbb{R}}^n$. A general principle for the existence of at least one solution with graph staying for every $k\in\{a,a+1,a+2,\dots\}$ in previously prescribed domain is formulated. Such solutions are defined by means of the corresponding initial data and their existence is proved by means of retract type approach. For the development of this approach a notion of egress type points lying on the defined boundary of a given domain and with respect to the system considered is utilized. Unlike previous investigations, the boundary can contain points which are not points of egress type, too. Examples are inserted to illustrate the obtained result.

Key words Discrete equation Consequent point Retract

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