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ASYMPTOTICALLY ALMOST PERIODIC SOLUTIONS OF LIMIT PERIODIC DIFFERENCE SYSTEMS WITH COEFFICIENTS FROM COMMUTATIVE GROUPS

Petr Hasil — Michal Veselý

Abstract. We study the behaviour of solutions of limit periodic difference systems over (infinite) fields with absolute values. The considered systems are described by the coefficient matrices that belong to commutative groups whose boundedness is not required. In particular, we are interested in special systems with solutions which vanish at infinity or which are not asymptotically almost periodic. We obtain a transparent condition on the matrix groups which ensures that the special systems form a dense subset in the space of all considered systems, i.e. that, in any neighbourhood of any considered limit periodic system, there exists a system which have non-asymptotically almost periodic or vanishing solutions. The presented results improve and extend known ones.

1. Introduction

The subject of the research presented in this paper is given by the theory of perturbations of difference systems in the form

$$x_{k+1} = A_k \cdot x_k, \tag{1.1}$$

where the coefficient matrices A_k are elements of a commutative group $\mathcal{X}$ for all considered k. In the center of our interest is the existence of non-asymptotically

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