

Existence of a bounded solution of Volterra difference equations via Darbo's fixed point theorem

TOMASZ GRONEK¹, EWA SCHMEIDEL²

¹ *Department of Mathematics, University of Žilina, 01026 Žilina, SLOVAK REPUBLIC.*
E-mail address: tomgronek@gmail.com

² *Institute of Mathematics, Faculty of Mathematics and Computer Science, University of Białystok, 15097 Białystok, POLAND.*
E-mail address: eschmeidel@math.uwb.edu.pl

We study linear Volterra difference equation of nonconvolution type on the form

$$x(n+1) = a(n) + b(n)x(n) + \sum_{i=0}^n K(n,i)x(i),$$

where $x: \mathbb{N} \rightarrow \mathbb{R}$, $a: \mathbb{N} \rightarrow \mathbb{R}$, $K: \mathbb{N} \times \mathbb{N} \rightarrow \mathbb{R}$ and $b: \mathbb{N} \rightarrow \mathbb{R}$. Sufficient conditions for an existence of bounded solution of this equation are presented. Using this result, an asymptotic equivalence of a solution and of the given sequence, dependent on terms of sequence b , is obtained.

References

- [1] J. Diblík, M. Růžicková, E. Schmeidel, *Asymptotically periodic solutions of Volterra difference equations*, Tatra Mt. Math. Publ., **43** (2009), 43–61.
- [2] J. Diblík, M. Růžicková, E. Schmeidel, M. Zbąszyniak, *Weighted asymptotically periodic solutions of linear Volterra difference equations*, Abstr. Appl. Anal., (2011), Art. ID 370982, 14 pp.
- [3] J. Diblík, E. Schmeidel, *On the existence of solutions of linear Volterra difference equations asymptotically equivalent to a given sequence*, Appl. Math. Comput., **218** (2012), 9310–9320.
- [4] T. Gronek, E. Schmeidel, *Existence of a bounded solution of Volterra difference equations via Darbo's fixed point theorem* (submitted).