

# Existence of Periodic Solutions for a Class of Fourth-order Difference Equation

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## Abstract

We apply the continuation theorem of Mawhin to ensure that a fourth-order nonlinear difference equation of the form  $\Delta^4 u(k-2) - a(k)u^{\alpha}(k) + b(k)u^{\beta}(k) = 0$ , with periodic boundary conditions possesses at least one nontrivial positive solution, where  $\Delta u(k) = u(k+1) - u(k)$  is the forward difference operator,  $\alpha, \beta \in \mathbb{N}^+$  and  $\alpha \neq \beta$ .  $a(k), b(k)$  are  $T$ -periodic functions and  $a(k)b(k) > 0$ . As applications, we will give some examples to illustrate the application of these theorems.

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