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On the eigenvalue problem of a class of linear partial difference equations

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In this paper, the eigenvalue problem of a class of linear partial difference equations is studied. The results concern the existence of eigenvalues, their character (real, positive), as well as the behavior of its eigenfunctions (positivity, oscillation). Moreover a theorem is given concerning the existence of a unique solution of an associated non-homogeneous partial difference equation. The results generalize previously known results for ordinary linear difference equations. The method used is a functional-analytic one, which transforms the eigenvalue problem for the difference equation into the equivalent problem of the eigenvalues of an operator defined on an abstract separable Hilbert space.

Keywords: linear partial difference equations; eigenvalues; eigenfunctions

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