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**On the spectrum of a Leslie matrix with a near-periodic fecundity pattern.** (English)

Zbl 0762.92015

Linear Algebra Appl. 178, 261-279 (1993).

Summary: Leslie matrices are square and nonnegative, and arise in the classical discrete, age-dependent model of population growth. Their eigenvalues are important in determining the asymptotic behavior of the age distributions in the model. Denoting the top row of the Leslie matrix by  $[m_1 m_2 \cdots m_n]$ , it is well-known that if  $d = \gcd\{i | m_i > 0\} \geq 2$  (which corresponds to a periodic fecundity pattern), then the matrix has  $d$  eigenvalues with moduli equal to its spectral radius.

We consider Leslie matrices with a near-periodic fecundity pattern (roughly speaking,  $m_i > 0$  only if  $i$  is close to a multiple of some  $d \neq 1$ ) and show that such matrices have at least two nonreal eigenvalues with moduli close to the spectral radius. We discuss a specific example of such a Leslie matrix which appears in the demographic literature, and give a numerical example to show that the age distributions in the model can also exhibit near-periodic behavior.

**MSC:**

92D25 Population dynamics (general)  
15A18 Eigenvalues, singular values, and eigenvectors  
15A99 Basic linear algebra

Cited in 1 Review  
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**Keywords:**

asymptotic behavior of age distributions; Leslie matrices; discrete, age- dependent model of population growth; near-periodic fecundity pattern; nonreal eigenvalues; spectral radius

**Full Text:** DOI

**References:**

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