

HONOURS SEMINAR

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Null Vectors, Schur-complements, and Parter Vertices

Supervised by Dr. Shaun Fallat

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2:30 pm

Abstract:

One of the most important historical contributions to the inverse eigenvalue problem associated with trees is the celebrated Parter-Wiener Theorem. This theorem states if T is a tree with an associated real symmetric matrix, A , and $m_A(\lambda) \geq 2$, then there exists some vertex $v \in T$ that, upon deletion from T , results in $m_{A(v)}(\lambda) = m_A(\lambda) + 1$ for the eigenvalue λ . In this talk, we offer an alternate elementary proof of this seminal result utilizing the basic matrix tool known as the Schur-complement in connection with analyzing the null space structure of matrices whose graph is a tree. Moreover, the techniques used in our proof can be applied to an extension of this result by only requiring $\lambda \in \sigma(A) \cap \sigma(A(v))$ to obtain a significant generalization of the classical Parter-Wiener theorem.

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