# AI Summary Report

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This paper focuses on the spectral properties of matrices arising from B-spline collocatio n methods applied to Riesz fractional differential equations. The authors demonstrate a To eplitz-like structure in the coefficient matrices for arbitrary polynomial degree 'p' and analyze their spectral properties using the symbol. Key findings include the ill-condition ing of the matrices in both low and high frequencies for large 'p', a single zero of order $\alpha$ at 0 of the symbol, and an exponential decay to zero at $\pi$ for increasing 'p'. Furtherm ore, the central entries of the coefficient matrices are expressed as inner products of fr actional derivatives of cardinal B-splines. Numerical studies suggest an approximation or der of $p+2-\alpha$ for even 'p' and $p+1-\alpha$ for odd 'p' for smooth solutions. Overall, the paper p rovides insights into the structure and spectral behavior of matrices related to B-spline collocation for fractional differential equations.