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# Contents



**Abstract.**

For a given the -numerical range of an matrix polynomial is defined by . In this paper, an inclusion-exclusion methodology for the estimation of is proposed. Our approach is based on i) the discretization of a region that contains , and ii) the construction of an open circular disk, which does not intersect , centered at every grid point . For the cases and an important difference arises in one of the steps of the algorithm. Thus, these two cases are discussed separately.

**Key Words.**
matrix polynomial, eigenvalue, -numerical range, boundary, inner -numerical radius, Davis-Wielandt shell.

**AMS(MOS) Subject Classifications.**
15A22, 15A60, 65D18, 65F30, 65F35.

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/etna/vol.17.2004/pp1-10.dir/pp1-10.ps;
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**Forward References.**



**Abstract.**

In this paper we consider polynomial collocation methods for the numerical solution of a singular integral equation over the interval, where the operator of the equation is supposed to be of the form with the Cauchy singular integral operator, with piecewise continuous coefficients and and with a Jacobi weight denotes an integral operator with a continuous kernel function. To the integral equation we apply two collocation methods, where the collocation points are the Chebyshev nodes of the first and second kind and where the trial space is the space of polynomials multiplied by another Jacobi weight. For the stability and convergence of this collocation scheme in weighted -spaces, we derive necessary and sufficient conditions. Moreover, we discuss stability of operator sequences belonging to algebras generated by the sequences of the collocation methods for the above described operators. Finally, the so-called splitting property of the singular values of the sequences of the matrices of the discretized equations is proved.

**Key Words.**

**Forward References.**