

## A POLYNOMIAL COLLOCATION METHOD FOR CAUCHY SINGULAR INTEGRAL EQUATIONS OVER THE INTERVAL\*

P. JUNGHANNS<sup>†</sup> AND A. RATHSFELD<sup>‡</sup>

**Abstract.** In this paper we consider a polynomial collocation method for the numerical solution of a singular integral equation over the interval. More precisely, the operator of our integral equation is supposed to be of the form  $aI + \mu^{-1}bS\mu I + K$  with  $S$  the Cauchy integral operator, with piecewise continuous coefficients  $a$  and  $b$ , with a regular integral operator  $K$ , and with a Jacobi weight  $\mu$ . To the equation  $[aI + \mu^{-1}bS\mu I + K]u = f$  we apply a collocation method, where the collocation points are the Chebyshev nodes of the 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 in weighted  $L^2$  spaces, we derive necessary and sufficient conditions.

**Key words.** Cauchy singular integral equation; polynomial collocation method; stability.

**AMS subject classifications.** 45L10; 65R20; 65N38.

---

\*Received October 30, 2000. Accepted for publication February 28, 2001. Communicated by Sven Ehrlich.

<sup>†</sup>Fakultät für Mathematik, Technische Universität Chemnitz, D-09107 Chemnitz, Germany, peter.junghanns@mathematik.tu-chemnitz.de

<sup>‡</sup>Weierstrass-Institut für Angewandte Analysis und Stochastik, Mohrenstr. 39, D-10117 Berlin, Germany, rathsfeld@wias-berlin.de