A HIGH ORDER NYSTROEM-TYPE METHOD FOR WEAKLY SINGULAR FREDHOLM INTEGRAL EQUATIONS

ARVET PEDAS AND GENNADI VAINIKKO

Institute of Mathematics, University of Tartu

50409, Tartu, Liivi 2, Estonia

E-mail: `arvet.pedas@ut.ee, gennadi.vainikko@ut.ee`

In the first part of the talk the regularity of a solution to a linear weakly singular Fredholm integral equation of the second kind is discussed. The kernel of the integral equation may have diagonal and boundary singularities. Assuming certain differentiability properties of the kernel and free term, we estimate the growth rates of the derivatives of the exact solution near the boundary of the domain of integration.

In the second part we perform a change of variables which improves the boundary behaviour of the kernel and exact solution. After that, using a piecewise polynomial approximation of the solution on mildly graded or uniform grids, we solve the transformed equation by a product integration method. Global convergence estimates are derived and an improvement of the convergence order for a skilled choice of the interpolation points is discussed.