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Nyström methods for approximating the solutions of an integral equation arising from a problem in mathematical biology. (English) Zbl 07418833

Summary: The paper deals with an integral equation arising from a problem in mathematical biology. We propose approximating its solution by Nyström methods based on Gaussian rules and on product integration rules according to the smoothness of the kernel function. In particular, when the latter is weakly singular we propose two Nyström methods constructed by means of different product formulas. The first one is based on the Lagrange interpolation while the second one is based on discrete spline quasi-interpolants. The stability and the convergence of the proposed methods are proved in uniform spaces of continuous functions. Finally, some numerical tests showing the effectiveness of the methods and the sharpness of the obtained error estimates are given.

MSC:
65Rxx Numerical methods for integral equations, integral transforms
41Axx Approximations and expansions
65Dxx Numerical approximation and computational geometry (primarily algorithms)

Keywords:
Fredholm integral equation; Nyström method; Lagrange interpolation; discrete spline quasi-interpolants

Full Text: DOI

References: