

A Nyström method for approximating the solutions of an integral equation arising from a problem in mathematical biology

M. C. De Bonis¹, M. P. Stanić², and T. V. Tomović²

¹Department of Mathematics, Computer Sciences and Economics, University of Basilicata, Italy,
mariacarmela.debonis@unibas.it

²Department of Mathematics and Informatics, Faculty of Science, University of Kragujevac,
Serbia, stanicm@kg.ac.rs, tomovict@kg.ac.rs

We consider integral equations of the following type

$$(1) \quad f(x) \int_0^1 k(x-y)dy + \int_0^1 k(y-x)f(y)dy = g(x), \quad 0 < x < 1,$$

where k is a given convolution kernel, g is a known function and f is the unknown.

The above integral equation is of interest because it arises from a problem in mathematical biology [1].

We propose to approximate the solutions of (1) by a Nyström method using the Gauss-Legendre quadrature rule. The stability and the convergence are proved in uniform spaces of continuous functions. Finally, numerical tests showing the effectiveness of the method are presented.

References

- [1] S. P. Eveson, An integral equation arising from a problem in mathematical biology, Bull. Lond. Math. Soc. **23**(3) (1991), 293–299.