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# A NEWTON-LIKE ITERATIVE PROCESS FOR THE NUMERICAL SOLUTION OF FREDHOLM NONLINEAR INTEGRAL EQUATIONS

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ABSTRACT. In this paper, we give a semi-local convergence result for an iterative process of Newton-Kantorovich-type to solve nonlinear integral equations of Fredholm type and second kind. We also illustrate with several examples the technique for constructing a functional sequence that approaches solutions.

**1. Introduction.** Consider a nonlinear integral equation of Fredholm type and second kind

$$\phi(x) = f(x) + \lambda \int_a^b K(x,t)H(\phi(t))\,dt, \quad x \in [a,b], \tag{1}$$

where $\lambda$ is a real number, the kernel $K(x,t)$ is a continuous function in $[a,b] \times [a,b]$, $H : \mathbf{R} \to \mathbf{R}$ is a differentiable real function, and $f(x)$ is a given continuous real function defined in $[a,b]$. When $H$ is a linear function, there are several numerical methods to approximate the solution of this type of equations [**9, 10**]. If $H$ is nonlinear, the more usual numerical procedures, such as Nyström, Galerkin, collocation, etc., methods [**4, 6**] have the following two principal aspects. Firstly, equation (1) is discretized and the associated nonlinear finite system is solved by applying some methods to approximate the solutions. Next, by interpolation, we obtain the approximation of the solution. Our technique is different because we apply directly an iterative method to integral equation (3). So, in this way we obtain approximations to the solution.

*Key words and phrases.* Fredholm integral equation, Iterative method, Newton-like method.
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