Golovach, G. P.; **Kalajda, A. F.**

On the convergence rate of the method of successive approximations for the solution of nonlinear integral equations of Volterra type. (Russian) Zbl 0533.65092

Vychisl. Prikl. Mat., Kiev 44, 21-31 (1981).

Let f(x), K(x,s,u) be continuous in $D = \{(x,s) \in [a,b] : \quad |u - f(a)| \leq l, \quad l > 0\}$; $|K(x,s,u) - K(x,s,v)| \leq N(x,s)|u-v|$ in D, then for $a \leq x \leq \min(b, a + (1 - \max_{a\leq x\leq b} |f(x) - f(a)|) \cdot (\max_D |K(x,s,u)|)^{-1}$ there exists a unique and continuous solution of $\phi(x) = f(x) + \int_a^x K(x,s,\phi(s))ds$, and the sequence $\phi_{n+1}(x) = f(x) + \int_a^x K(x,s,\phi_n(s))ds (n = 0,1,...)$ converges to it.

Moreover,

$$\max_{a\leq x\leq h} |\phi_{n+1}(x) - \phi_n(x)| \leq \frac{1}{n!} \| \int_a^x K(x,s,f(s))ds \|_C (\int_a^h \max_{x\in[s,h]} N(x,s)ds)^n$$

$(n = 1, 2, ...)$. An example is given.

Reviewer: J.Albrycht

MSC:

65R20 Numerical methods for integral equations
45G10 Other nonlinear integral equations

Keywords:

convergence rate; method of successive approximations; Volterra type