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ATTRACTING SOLUTIONS OF NONLINEAR VOLTERRA INTEGRAL EQUATIONS

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ABSTRACT. This paper is devoted to studying the uniqueness and the attracting character of nontrivial solutions for some nonlinear Volterra integral equations. Also, a simple method to approximate the nontrivial solution is provided.

0. Introduction. We are interested in the nonlinear Volterra integral equations

$$(k,g) \qquad u(x) = \int_0^x k(x-s)g(u(s))\,ds,$$

from now on referred to as equation (k,g). The operator

$$(T_{k,g}) \qquad T_{k,g}u(x) = \int_0^x k(x-s)g(u(s))\,ds$$

shall be referred to as the *associated operator* to equation (k,g).

These equations appear in connection with several physical models: diffusion problems such as percolation from a reservoir [**7**] or fabrication of microchips [**8**], nonlinear models about the behavior of the shock-wave front in gas-filled tubes [**6**], etc. The physical models considered impose some restrictions on the *kernel* k and the *nonlinearity* g. The kernel k is always a nonnegative locally integrable function, and g is a continuous increasing function such that $g(0) = 0$. A solution of those equations is the function zero; so, our interest is centered on nontrivial solutions, i.e., positive solutions different from zero in every neighborhood of 0. When the equation (k,g) admits nontrivial solutions we say that (k,g) is *admissible*.

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