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PERTURBATION OF LINEAR ABSTRACT VOLTERRA EQUATIONS

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In their pioneering work on Qualitative Theory of Volterra Equations, J. J. Levin and J.A. Nohel have dealt with nonlinear perturbations of Volterra equations of convolution type. Their joint paper [**8**] on this topic is, likely, the first in the literature dedicated to this subject.

The author [**2**] has investigated some perturbation problems, in the case of nonconvolution equations, mostly related to the concept of admissibility for integral operators/equations. The role of the resolvent kernel is particularly emphasized in regard to the behavior of solutions, and the Volterra equations provide most of the illustrations. The case of a convolution equation, but not of Volterra type, is also investigated.

In their recent book [**6**], the authors dedicate a whole chapter to the perturbation theory of integral/integro-differential equations. Further references can be found in [**6**], especially those of a more recent date.

The aim of this paper is to discuss perturbed equations associated with *abstract* Volterra equations. We will consider only the case when the unperturbed equation is linear, namely,

$$x(t) = (Lx)(t) + (Nx)(t), \tag{1}$$

or

$$\dot{x}(t) = (Lx)(t) + (Nx)(t). \tag{2}$$

In both equations (1) and (2), L stands for a linear abstract Volterra operator acting on some function space, while N denotes a nonlinear operator acting on the same or another function space, not necessarily of Volterra type. Of course, when N is also a Volterra (abstract) operator, the equations (1) and (2) are both of Volterra type.

For the definition of Volterra operators and the basic properties of attached equations we refer the reader to our recent book [**5**], in which these topics are discussed in some detail. See also [**11**].