Stability in Volterra Integro-differential Equatinsn

Abstract

In this research, we utilize the notion of of fundamental matrix solution and show that if the zero solution of the homogeneous system

$$X'(t) = AX(t), X(t_0) = X_0, \;\; t \geq t_0 \geq 0,$$

is stable, uniformly stable, asymptotically stable and uniformly asymptotically stable then so does the zero solution of the Volterra integro-differential equation with or without perturbation

$$X'(t) = AX(t) + \int_0^t C(t,s)X(s)ds + g(t, X(t)), \;\; t \geq t_0 \geq 0$$

under the proper conditions.