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Delayed Functional Differential Equation Control Systems: A Spectral Optimization Approach.

The spectral method of G. N. Elnagar, which yields spectral convergence rate for the approximate solutions of Volterra-Hammerstein integral equations, is generalized in order to solve the class of time-delayed functional differential equation control systems with spectral accuracy. The proposed method is based on the idea of relating spectrally constructed grid points to the structure of projection operators which will be used to approximate the control vector and the associated state vector. The problem is first formulated as a delay free optimal control problem governed by integral equation and a system of PDEs with nonlocal boundary conditions. Due to its dynamic nature, the proposed method avoids many of the numerical difficulties typically encountered in solving standard time-delayed functional differential equation control systems. (Received September 21, 2012)