Solution of matrix Riccati differential equation for nonlinear singular system using neural networks

Abstract

In this paper, the solution of the matrix Riccati differential equation (MRDE) for nonlinear singular system is obtained using neural networks. The goal is to provide optimal control with reduced calculus effort by comparing the solutions of the MRDE obtained from well known traditional Runge Kutta (RK) method and nontraditional neural network method. Accuracy of the neural solution to the problem is qualitatively better. The advantage of the proposed approach is that, once the network is trained, it allows instantaneous evaluation of solution at any desired number of points spending negligible computing time and memory. The computation time of the proposed method is shorter than the traditional RK method. An illustrative numerical example is presented for the proposed method.

Reference


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