Chapter 6

Conclusions

In this thesis, the definition and approximation of fractional order operator are introduced briefly. Then the double Mackey-Glass delay systems in integral and fractional forms are described. We find the chaos which exists in the integral system and in fractional systems with orders 0.9, 0.8, 0.1 by phase portraits and the bifurcation diagrams.

In Section 3, temporary lag or anticipated synchronization and the lag or anticipated anti-synchronization of double Mackey-Glass systems with small and similar initial conditions are discovered. For the first interval of TLS, w hen all initial values are positive, temporary lag synchronizations are found. The trajectory will be reversed if the initial condition of x_1 or y_1 is negative. In these cases, the lag or anticipated anti-synchronization exists. From the results of simulation, we find six temporary lag (anticipated) synchronization intervals in 30000seconds.

In Section 4, we apply the parameter excited method to control the double Mackey-Glass system and to synchronize two uncoupled double Mackey-Glass systems. By replacing the corresponding parameters of chaotic system with noise, chaos control and chaos synchronization can be accomplished. Finally, numerical simulations show the proposed method is effective to suppress the chaotic behavior and drag the trajectories to the origin. Also, chaos synchronizations are successfully achieved in many cases with Rayleigh noise Rician noise, and uniform noise respectively.

Moreover, by replacing the corresponding parameters of the systems with two lag noise signals and choose the appropriate noise strength, the lag synchronization

can be successfully obtained in Section 5. Temporary lag synchronization, partial lag synchronization, chaos control and robustness of lag synchronization are also obtained. The parameter excited method is effective to synchronize two systems, for which coupling scheme of synchronization is diff icult or even impossible. The abundance of various phenomena fully exhibits the potential application of this method.