Date & Time

9th **February 2018, Friday @ 3.15 pm**

Venue

Al-Farabi Seminar Room, Second Floor, INSPEM

Presenter

Dr. Seyed Ali Ahmadian
Research Fellow
Laboratory of Computational Sciences and Mathematical Physics

Topic

Fractional Differential Systems: A Fuzzy Solution Based on Operational Matrix of Shifted Chebyshev Polynomials and its Applications

Abstract

In this paper, a new formula of fuzzy Caputo fractional-order derivatives in terms of shifted Chebyshev polynomials is derived. The proposed approach introduces shifted Chebyshev operational matrix in combination with shifted Chebyshev tau technique for the numerical solution of linear fuzzy fractional order differential equations. The main advantage of the propose approach is that it simplifies the problem alike in solving a system of fuzzy algebraic linear equation. An approximated error bound between the exact solution and the proposed fuzzy solution with respect to the number of fuzzy rules and solution errors is derived. Furthermore, we also discuss the convergence of the proposed method from the fuzzy perspective. Experimentally, we show the strength of the proposed method in solving a variety of FDE models under uncertainty encountered in engineering and physical phenomena (i.e. viscoelasticity, oscillations and Resistor-Capacitor (RC) circuits). Comparisons are also made with solutions obtained by the Laguerre polynomials and fractional Euler method.