Numerical solution, based on Taylor expansion for ordinary differential equations and integral equations

Mohsen Didgar*,Dr. Alireza Vahidi,

In this thesis, a novel application of Taylor expansion method is proposed to solve integral equations, ordinary differential equations, fractional differential equations, and systems of including them. The method is based on combining the nth-order Taylor expansion of unknown function at an arbitrary point and integration method, such that the given integral equation is converted into a system of linear equations with respect to unknown function and its derivatives. The required solution is obtained by solving the resulting linear system. The nth-order approximate solution is equal to exact solution if the exact solution is polynomial function of degree less than or equal to n. An error analysis is given as well as several numerical examples to illustrate the efficiency of the proposed method.

Keywords : integral equations،ordinary differential equations،fractional differential equations