Abstract

In this article, a numerical technique for solving numerically the fractional-order logistic equation (FLE) is presented. The fractional-order derivative of the studied problem is given through the Caputo operator of fractional derivatives. The first kind of Dickson polynomials is used as a basis for the desirable approximate solution. The presented technique is based on the operational matrices of these polynomials in both cases of integer and fractional-order derivatives. The handled problem will be transformed into a system of matrices that will be solved via an appropriate numerical technique. In detail, the convergence and error estimate of the suggested technique is discussed. Many numerical applications in several fields will be given to demonstrate the applicability, accuracy, and efficiency of the introduced technique. These numerical results will be compared to support our obtained theoretical results from one side and from another side to show the advantage of our method over some of the previous methods used in solving such applications.