**Advantages of using fractional Caputo-Hadamard derivative**

**In epidemic model**

Abdolbaghi Soltani Joujehi1, Hamidreza Marasi2  
  
1 Department of Applied Mathematics, Faculty of Mathematical Sciences, University of Tabriz, Tabriz, Iran

2 Department of Applied Mathematics, Faculty of Mathematical Sciences, University of Tabriz, Tabriz, Iran

[a.soltanijoujehi@gmail.com](mailto:a.soltanijoujehi@gmail.com)  
[marasi@tabrizu.ac.ir](mailto:marasi@tabrizu.ac.ir)

*Abstract*— In this paper, we study the numerical analysis and application epidemic model on long-time intervals of a non-fatal disease in a population. The epidemic model with unknown parameters, as an important issue for scientists in the study of medical care for the people. In this work, an efficient technique is based on the fractional Caputo-Hadamard derivative and is applied to solve this epidemic model. The fractional derivative is described in the Caputo-Hadamard sense. Also we consider the use of the fractional Adams-type methods. Numerical results are presented.

Keywords—*Fractional linear multistep methods, Fractional order epidemic model, Fractional Caputo-Hadamard derivative, System of nonlinear differential equations.*

##### References

1. D.W. Jorden and P. Smith, “Nonlinear ordinary differential equations,” third ed., Oxford University Press, 1999.
2. F‎. ‎Brauer‎ and ‎C‎. Castillo-Chavez, “Mathematical models in population biology and epidemiology,” second ed.‎, ‎Springer‎, ‎2012‎.
3. S.Z. Rida, A.S.A. Rady, A.A.M. Arafa and M. Khalil, “Approximate analytical solution of the fractional epidemic model,” IJAMR 1 (1), pp. 17-29 (20012).
4. J. Biazar, “Solution of the epidemic model by Adomian decomposition method,” Appi. Math. Comput. 173 (2), pp. 1101-1106 (2006).