

1. [Transmissibility of epidemic diseases caused by delay with local proportional fractional derivative](#)

Epidemiological models have been playing a vital role in different areas of biological sciences for the analysis of various contagious diseases. Transmissibility of virulent diseases is being portrayed in the ...

Authors: Abdullah Khamis Alzahrani, Oyoon Abdul Razzaq, Najeeb Alam Khan, Ali Saleh Alshomrani and Malik Zaka Ullah

Citation: *Advances in Difference Equations* 2021 2021:292

Content type: Research

Published on: 14 June 2021

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2. [Dynamics and bifurcation analysis of a state-dependent impulsive SIS model](#)

Recently, considering the susceptible population size-guided implementations of control measures, several modelling studies investigated the global dynamics and bifurcation phenomena of the state-dependent imp...

Authors: Jinyan Wang

Citation: *Advances in Difference Equations* 2021 2021:287

Content type: Research

Published on: 12 June 2021

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3. [Mathematical analysis and optimal control interventions for sex structured syphilis model with three stages of infection and loss of immunity](#)

In this study, we develop a nonlinear ordinary differential equation to study the dynamics of syphilis transmission incorporating controls, namely prevention and treatment of the infected males and females. We...

Authors: Abdulfatai Atte Momoh, Yusuf Bala, Dekera Jacob Washachi and Dione Déthié

Citation: *Advances in Difference Equations* 2021 2021:285

Content type: Research

Published on: 11 June 2021

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4. [Dynamical features of pine wilt disease through stability, sensitivity and optimal control](#)

This work investigates the dissemination mechanism of pine wilt disease. The basic reproduction number is computed explicitly, and an ultimate invariable level of contagious hosts and vectors, without and with...

Authors: Riaz Ahmad Khan, Takasar Hussain, Muhammad Ozair, Fatima Tasneem and Muhammad Faizan

Citation: *Advances in Difference Equations* 2021 2021:261

Content type: Research

Published on: 19 May 2021

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5. [A mathematical model for the spread of COVID-19 and control mechanisms in Saudi Arabia](#)

In this work, we develop and analyze a nonautonomous mathematical model for the spread of the new corona-virus disease (*COVID-19*) in Saudi Arabia. The model includes eight time-dependent compartments: the dynamic...

Authors: Mostafa Bachar, Mohamed A. Khamsi and Messaoud Bounkhel

Citation: *Advances in Difference Equations* 2021 2021:253

Content type: Research

Published on: 14 May 2021

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6. [Extinction and persistence of a stochastic SIRV epidemic model with nonlinear incidence rate](#)

In this paper, a stochastic SIRV epidemic model with general nonlinear incidence and vaccination is investigated. The value of our study lies in two aspects. Mathematically, with the help of Lyapunov function ...

Authors: Ramziya Rifhat, Zhidong Teng and Chunxia Wang

Citation: *Advances in Difference Equations* 2021 2021:200

Content type: Research

Published on: 8 April 2021

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7. [A time-delay COVID-19 propagation model considering supply chain transmission and hierarchical quarantine rate](#)

In this manuscript, we investigate a novel Susceptible–Exposed–Infected–Quarantined–Recovered (SEIQR) COVID-19 propagation model with two delays, and we also consider supply chain transmission and hierarchical...

Authors: Fangfang Yang and Zizhen Zhang

Citation: *Advances in Difference Equations* 2021 2021:191

Content type: Research

Published on: 30 March 2021

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8. [Lyapunov stability analysis for nonlinear delay systems under random effects and stochastic perturbations with applications in finance and ecology](#)

This manuscript is involved in the study of stability of the solutions of functional differential equations (FDEs) with random coefficients and/or stochastic terms. We focus on the study of different types of ...

Authors: Abdulwahab Almutairi, H. El-Metwally, M. A. Sohaly and I. M. Elbaz

Citation: *Advances in Difference Equations* 2021 2021:186

Content type: Research

Published on: 25 March 2021

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9. [Caputo SIR model for COVID-19 under optimized fractional order](#)

Everyone is talking about coronavirus from the last couple of months due to its exponential spread throughout the globe. Lives have become paralyzed, and as many as 180 countries have been so far affected with...

Authors: Ali S. Alshomrani, Malik Z. Ullah and Dumitru Baleanu

Citation: *Advances in Difference Equations* 2021 2021:185

Content type: Research

Published on: 24 March 2021

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10. [Theoretical and numerical analysis for transmission dynamics of COVID-19 mathematical model involving Caputo–Fabrizio derivative](#)

This manuscript is devoted to a study of the existence and uniqueness of solutions to a mathematical model addressing the transmission dynamics of the coronavirus-19 infectious disease (COVID-19). The mentione...

Authors: Sabri T. M. Thabet, Mohammed S. Abdo and Kamal Shah

Citation: *Advances in Difference Equations* 2021 2021:184

Content type: Research

Published on: 24 March 2021

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11. [A hepatitis stochastic epidemic model with acute and chronic stages](#)

The article is based on the study of hepatitis transmission dynamics using a stochastic epidemic model. We discuss the stochastic perturbations of our proposed model by considering the effect of environmental ...

Authors: Amir Khan, Ghulam Hussain, Abdullahi Yusuf, Auwalu Hamisu Usman and Usa Wannasingha Humphries

Citation: *Advances in Difference Equations* 2021 2021:181

Content type: Research

Published on: 23 March 2021

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12. [Analysis of Atangana–Baleanu fractional-order SEAIR epidemic model with optimal control](#)

We consider a SEAIR epidemic model with Atangana–Baleanu fractional-order derivative. We approximate the solution of the model using the numerical scheme developed by Toufic and Atangana. The numerical simulat...

Authors: Chernet Tuge Deressa and Gemechis File Duressa

Citation: *Advances in Difference Equations* 2021 2021:174

Content type: Research

Published on: 19 March 2021

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13. [Effects of masks on the transmission of infectious diseases](#)

In the present paper, based on the conditions that asymptomatic virus carriers are contagious and all symptomatic infected individuals wear masks, we study the impact of wearing masks in the susceptible and th...

Authors: Lili Han, Qiuhui Pan, Baolin Kang and Mingfeng He

Citation: *Advances in Difference Equations* 2021 2021:169

Content type: Research

Published on: 18 March 2021

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14. [Fractional unit-root tests allowing for a fractional frequency flexible Fourier form trend: predictability of Covid-19](#)

In this study we propose a fractional frequency flexible Fourier form fractionally integrated ADF unit-root test, which combines the fractional integration and nonlinear trend as a form of the Fourier function...

Authors: Tolga Omay and Dumitru Baleanu

Citation: *Advances in Difference Equations* 2021 2021:167

Content type: Research

Published on: 15 March 2021

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15. [Measles dynamics on network models with optimal control strategies](#)

To investigate the influences of heterogeneity and waning immunity on measles transmission, we formulate a network model with periodic transmission rate, and theoretically examine the threshold dynamics. We nu...

Authors: Yuyi Xue, Xiaoe Ruan and Yanni Xiao

Citation: *Advances in Difference Equations* 2021 2021:138

Content type: Research

Published on: 27 February 2021

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16. [A reaction-diffusion HFMD model with nonsmooth treatment function](#)

Hand, foot, and mouth disease (HFMD) is a contagious viral illness that commonly affects infants and children. In some areas with high incidence of this disease, the relevant departments often use some strateg...

Authors: Lei Shi, Hongyong Zhao and Daiyong Wu

Citation: *Advances in Difference Equations* 2021 2021:130

Content type: Research

Published on: 25 February 2021

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17. [Mathematical analysis of a within-host model of SARS-CoV-2](#)

In this paper, we have mathematically analyzed a within-host model of SARS-CoV-2 which is used by Li et al. in the paper “*The within-host viral kinetics of SARS-CoV-2*” published in (Math. Biosci. Eng. 17(4):2853–...

Authors: Bhagya Jyoti Nath, Kaushik Dehingia, Vishnu Narayan Mishra, Yu-Ming Chu and Hemanta Kumar Sarmah

Citation: *Advances in Difference Equations* 2021 2021:113

Content type: Research

Published on: 17 February 2021

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18. [**A fractional order mathematical model for COVID-19 dynamics with quarantine, isolation, and environmental viral load**](#)

COVID-19 or coronavirus is a newly emerged infectious disease that started in Wuhan, China, in December 2019 and spread worldwide very quickly. Although the recovery rate is greater than the death rate, the CO...

Authors: Mohammed A. Aba Oud, Aatif Ali, Hussam Alrabaiah, Saif Ullah, Muhammad Altaf Khan and Saeed Islam

Citation: *Advances in Difference Equations* 2021 2021:106

Content type: Research

Published on: 11 February 2021

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19. [**An SIR epidemic model for COVID-19 spread with fuzzy parameter: the case of Indonesia**](#)

The aim of this research is to construct an SIR model for COVID-19 with fuzzy parameters. The SIR model is constructed by considering the factors of vaccination, treatment, obedience in implementing health pro...

Authors: Muhammad Abdy, Syafruddin Side, Suwardi Annas, Wahyuddin Nur and Wahidah Sanusi

Citation: *Advances in Difference Equations* 2021 2021:105

Content type: Research

Published on: 11 February 2021

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20. [**On an SE\(Is\)\(Ih\)AR epidemic model with combined vaccination and antiviral controls for COVID-19 pandemic**](#)

In this paper, we study the nonnegativity and stability properties of the solutions of a newly proposed extended SEIR epidemic model, the so-called SE(Is)(Ih)AR epidemic model which might be of potential inter...

Authors: M. De la Sen and A. Ibeas

Citation: *Advances in Difference Equations* 2021 2021:92

Content type: Research

Published on: 1 February 2021

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21. **[Stability analysis of five-grade Leishmania epidemic model with harmonic mean-type incidence rate](#)**

In this paper, we discuss the Anthroponotic Cutaneous Leishmania transmission. In addition, we develop a mathematical model for the Anthroponotic Cutaneous Leishmania transmission and consider its qualitative ...

Authors: Karim Khan, Rahat Zarin, Amir Khan, Abdullahi Yusuf, Mohammed Al-Shomrani and Arif Ullah

Citation: *Advances in Difference Equations* 2021 2021:86

Content type: Research

Published on: 28 January 2021

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22. **[Modeling and forecasting the spread of COVID-19 with stochastic and deterministic approaches: Africa and Europe](#)**

Using the existing collected data from European and African countries, we present a statistical analysis of forecast of the future number of daily deaths and infections up to 10 September 2020. We presented nu...

Authors: Abdon Atangana and Seda İğret Araz

Citation: *Advances in Difference Equations* 2021 2021:57

Content type: Research

Published on: 20 January 2021

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23. **[Oscillation criteria for a class of third-order Emden–Fowler delay dynamic equations with sublinear neutral terms on time scales](#)**

In this paper, we study the oscillation of a class of third-order Emden–Fowler delay dynamic equations with sublinear neutral terms on time scales. By using Riccati transformation and integral inequality, we e...

Authors: Zhiyu Zhang and Ruihua Feng

Citation: *Advances in Difference Equations* 2021 2021:53

Content type: Research

Published on: 19 January 2021

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24. **[Complexity analysis of cold chain transportation in a vaccine supply chain considering activity inspection and time-delay](#)**

The development of COVID-19 vaccine is highly concerned by all countries in the world. So far, many kinds of COVID-19 vaccines have entered phase III clinical trial. However, it is difficult to deliver COVID-1...

Authors: Daoming Dai, Xuanyu Wu and Fengshan Si

Citation: *Advances in Difference Equations* 2021 2021:39

Content type: Research

Published on: 9 January 2021

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25. **[The influence of an infectious disease on a prey-predator model equipped with a fractional-order derivative](#)**

In this research, we discuss the influence of an infectious disease in the evolution of ecological species. A computational predator-prey model of fractional order is considered. Also, we assume that there is ...

Authors: Salih Djilali and Behzad Ghanbari

Citation: *Advances in Difference Equations* 2021 2021:20

Content type: Research

Published on: 7 January 2021

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26. **[Dynamical system of the growth of COVID-19 with controller](#)**

Recently, various studied were presented to describe the population dynamic of covid-19. In this effort, we aim to introduce a different vitalization of the growth by using a controller term. Our method is bas...

Authors: Rabha W. Ibrahim, Dania Altulea and Rafida M. Elobaid

Citation: *Advances in Difference Equations* 2021 2021:9

Content type: Research

Published on: 7 January 2021

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27. **[Mathematical model of SIR epidemic system \(COVID-19\) with fractional derivative: stability and numerical analysis](#)**

In this paper, we study and analyze the susceptible-infectious-removed (SIR) dynamics considering the effect of health system. We consider a general incidence rate function and the recovery rate as functions o...

Authors: Rubayyi T. Alqahtani

Citation: *Advances in Difference Equations* 2021 2021:2

Content type: Research

Published on: 4 January 2021

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28. [A fractional order approach to modeling and simulations of the novel COVID-19](#)

The novel coronavirus (SARS-CoV-2), or COVID-19, has emerged and spread at fast speed globally; the disease has become an unprecedented threat to public health worldwide. It is one of the greatest public health...

Authors: Isaac Owusu-Mensah, Lanre Akinyemi, Bismark Oduro and Olaniyi S. Iyiola

Citation: *Advances in Difference Equations* 2020 2020:683

Content type: Research

Published on: 3 December 2020

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29. [Crowding effects on the dynamics of COVID-19 mathematical model](#)

A disastrous coronavirus, which infects a normal person through droplets of infected person, has a route that is usually by mouth, eyes, nose or hands. These contact routes make it very dangerous as no one can...

Authors: Zizhen Zhang, Anwar Zeb, Ebraheem Alzahrani and Sohail Iqbal

Citation: *Advances in Difference Equations* 2020 2020:675

Content type: Research

Published on: 1 December 2020

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30. [A co-infection model of dengue and leptospirosis diseases](#)

In this paper an SIR deterministic mathematical model for co-infection of dengue and leptospirosis is proposed. We use a compartment model by using ordinary differential equations. The positivity of future sol...

Authors: Haileyesus Tessema Alemneh

Citation: *Advances in Difference Equations* 2020 2020:664

Content type: Research

Published on: 25 November 2020

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31. [Modeling the effect of delay strategy on transmission dynamics of HIV/AIDS disease](#)

In this manuscript, we investigate a nonlinear delayed model to study the dynamics of human-immunodeficiency-virus in the population. For analysis, we find the equilibria of a susceptible–infectious–immune sys...

Authors: Ali Raza, Ali Ahmadian, Muhammad Rafiq, Soheil Salahshour, Muhammad Naveed, Massimiliano Ferrara and Atif Hassan Soori

Citation: *Advances in Difference Equations* 2020 2020:663

Content type: Research

Published on: 25 November 2020

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32. [**Mathematical model of COVID-19 spread in Turkey and South Africa: theory, methods, and applications**](#)

A comprehensive study about the spread of COVID-19 cases in Turkey and South Africa has been presented in this paper. An exhaustive statistical analysis was performed using data collected from Turkey and South...

Authors: Abdon Atangana and Seda İğret Araz

Citation: *Advances in Difference Equations* 2020 2020:659

Content type: Research

Published on: 25 November 2020

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33. [**Analysis and simulation of a mathematical model of tuberculosis transmission in Democratic Republic of the Congo**](#)

According to the World Health Organization reports, tuberculosis (TB) remains one of the top 10 deadly diseases of recent decades in the world. In this paper, we present the modeling, analysis and simulation o...

Authors: Selain Kasereka Kabunga, Emile F. DOUNGMO GOUFO and Vinh Ho Tuong

Citation: *Advances in Difference Equations* 2020 2020:642

Content type: Research

Published on: 16 November 2020

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34. [**On the modeling of the interaction between tumor growth and the immune system using some new fractional and fractional-fractal operators**](#)

Humans are always exposed to the threat of infectious diseases. It has been proven that there is a direct link between the strength or weakness of the immune system and the spread of infectious diseases such a...

Authors: Behzad Ghanbari

Citation: *Advances in Difference Equations* 2020 2020:585

Content type: Research

Published on: 19 October 2020

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35. [Dynamics of an HIV model with cytotoxic T-lymphocyte memory](#)

We consider a four-dimensional HIV model that includes healthy cells, infected cells, primary cytotoxic T-lymphocyte response (CTLp), and secondary cytotoxic T-lymphocyte response (CTLs). The CTL memory genera...

Authors: Chunhua Liu and Lei Kong

Citation: *Advances in Difference Equations* 2020 2020:581

Content type: Research

Published on: 17 October 2020

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36. [Stochastic mathematical model for the spread and control of Corona virus](#)

This work is devoted to a stochastic model on the spread and control of corona virus (COVID-19), in which the total population of a corona infected area is divided into susceptible, infected, and recovered cla...

Authors: Sultan Hussain, Anwar Zeb, Akhter Rasheed and Tareq Saeed

Citation: *Advances in Difference Equations* 2020 2020:574

Content type: Research

Published on: 14 October 2020

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37. [Analysis of the stochastic model for predicting the novel coronavirus disease](#)

In this paper, we propose a mathematical model to predict the novel coronavirus. Due to the rapid spread of the novel coronavirus disease in the world, we add to the deterministic model of the coronavirus the ...

Authors: Ndolane Sene

Citation: *Advances in Difference Equations* 2020 2020:568

Content type: Research

Published on: 8 October 2020

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38. [Time-continuous and time-discrete SIR models revisited: theory and applications](#)

Since Kermack and McKendrick have introduced their famous epidemiological SIR model in 1927, mathematical epidemiology has grown as an interdisciplinary research discipline including knowledge from biology, co...

Authors: Benjamin Wacker and Jan Schlüter

Citation: *Advances in Difference Equations* 2020 2020:556

Content type: Research

Published on: 7 October 2020

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39. [Optimal control of visceral, cutaneous and post kala-azar leishmaniasis](#)

This article focuses on the eradication of different strains of leishmaniasis with the help of almost nonpharmaceutical interventions (NPIs). A comprehensive mathematical model of the disease is formulated inc...

Authors: M. Zamir, F. Nadeem and G. Zaman

Citation: *Advances in Difference Equations* 2020 2020:548

Content type: Research

Published on: 2 October 2020

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40. [Bifurcation analysis of a SEIR epidemic system with governmental action and individual reaction](#)

In this paper, the dynamical behavior of a SEIR epidemic system that takes into account governmental action and individual reaction is investigated. The transmission rate takes into account the impact of gover...

Authors: Abdelhamid Ajbar and Rubayyi T. Alqahtani

Citation: *Advances in Difference Equations* 2020 2020:541

Content type: Research

Published on: 1 October 2020

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41. [A reliable and competitive mathematical analysis of Ebola epidemic model](#)

The purpose of this article is to discuss the dynamics of the spread of Ebola virus disease (EVD), a kind of fever commonly known as Ebola hemorrhagic fever. It is rare but severe and is considered to be extre...

Authors: Muhammad Rafiq, Waheed Ahmad, Mujahid Abbas and Dumitru Baleanu

Citation: *Advances in Difference Equations* 2020 2020:540

Content type: Research

Published on: 1 October 2020

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42. [**A fractional system of delay differential equation with nonsingular kernels in modeling hand-foot-mouth disease**](#)

In this article, we examine a computational model to explore the prevalence of a viral infectious disease, namely hand-foot-mouth disease, which is more common in infants and children. The structure of this mo...

Authors: Behzad Ghanbari

Citation: *Advances in Difference Equations* 2020 2020:536

Content type: Research

Published on: 29 September 2020

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43. [**A numerical solution by alternative Legendre polynomials on a model for novel coronavirus \(COVID-19\)**](#)

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. This paper provides a numerical solution for the mathematical model of the novel coronavirus by the application...

Authors: Elham Hashemizadeh and Mohammad Ali Ebadi

Citation: *Advances in Difference Equations* 2020 2020:527

Content type: Research

Published on: 25 September 2020

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44. [**Bifurcation and optimal control analysis of a delayed drinking model**](#)

Alcoholism is a social phenomenon that affects all social classes and is a chronic disorder that causes the person to drink uncontrollably, which can bring a series of social problems. With this motivation, a ...

Authors: Zizhen Zhang, Junchen Zou and Soumen Kundu

Citation: *Advances in Difference Equations* 2020 2020:522

Content type: Research

Published on: 24 September 2020

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45. [Controlling heroin addiction via age-structured modeling](#)

The aim of the present study is to consider a heroin epidemic model with age-structure only in the active heroin users. The model was formulated with the help of available literature on heroin epidemic. Instea...

Authors: Anwarud Din and Yongjin Li

Citation: *Advances in Difference Equations* 2020 2020:521

Content type: Research

Published on: 24 September 2020

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46. [Stochastic SIRC epidemic model with time-delay for COVID-19](#)

Environmental factors, such as humidity, precipitation, and temperature, have significant impacts on the spread of the new strain coronavirus COVID-19 to humans. In this paper, we use a stochastic epidemic SIR...

Authors: F. A. Rihan, H. J. Alsakaji and C. Rajjivganthi

Citation: *Advances in Difference Equations* 2020 2020:502

Content type: Research

Published on: 18 September 2020

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47. [Stability analysis of a dynamical model of tuberculosis with incomplete treatment](#)

A simple deterministic epidemic model for tuberculosis is addressed in this article. The impact of effective contact rate, treatment rate, and incomplete treatment versus efficient treatment is investigated. W...

Authors: Ihsan Ullah, Saeed Ahmad, Qasem Al-Mdallal, Zareen A. Khan, Hasib Khan and Aziz Khan

Citation: *Advances in Difference Equations* 2020 2020:499

Content type: Research

Published on: 17 September 2020

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48. [Modeling and forecasting the spread tendency of the COVID-19 in China](#)

To forecast the spread tendency of the COVID-19 in China and provide effective strategies to prevent the disease, an improved SEIR model was established. The parameters of our model were estimated based on col...

Authors: Deshun Sun, Li Duan, Jianyi Xiong and Daping Wang

Citation: *Advances in Difference Equations* 2020 2020:489

Content type: Research

Published on: 14 September 2020

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49. [On modeling of coronavirus-19 disease under Mittag-Leffler power law](#)

This paper investigates a new model on coronavirus-19 disease (COVID-19) with three compartments including susceptible, infected, and recovered class under Mittag-Leffler type derivative. The mentioned derivat...

Authors: Samia Bushnaq, Kamal Shah and Hussam Alrabaiah

Citation: *Advances in Difference Equations* 2020 2020:487

Content type: Research

Published on: 11 September 2020

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50. [Fuzzy fractional-order model of the novel coronavirus](#)

In this paper, a novel coronavirus infection system with a fuzzy fractional differential equation defined in Caputo's sense is developed. By using the fuzzy Laplace method coupled with Adomian decomposition tr...

Authors: S. Ahmad, A. Ullah, K. Shah, S. Salahshour, A. Ahmadian and T. Ciano

Citation: *Advances in Difference Equations* 2020 2020:472

Content type: Research

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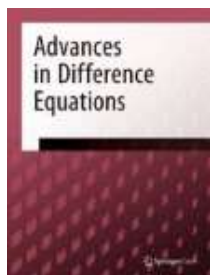
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