



SWAMI VIVEKANANDA UNIVERSITY

NEWSLETTER

**SCHOOL OF BASIC
SCIENCES**

VOL II, ISSUE IV

JULY-AUGUST

2025

MESSAGE FROM THE HOD

It gives me the greatest joy to connect with you through this edition of the four-newsletter. The School of Basic Sciences continues to uphold its commitment to academic excellence, research, and innovation. Our dedicated faculty and bright students are making remarkable strides in the various fields, contributing to the ever-expanding frontiers of knowledge. This year, we have witnessed significant accomplishments, from groundbreaking research publications to student accomplishments in national and international forums. Our department remains focused on fostering a culture of inquiry, curiosity, and collaboration, ensuring that our students receive the best foundation in the fundamental sciences. I take this opportunity to express my sincere gratitude to our faculty, researchers, and students for their unwavering dedication. Let's continue to strive for excellence and work toward making meaningful contributions to science and society.



Dr. SUBHABRATA
MONDAL
HOD and Assistant
Professor
School of Basic Sciences

MESSAGE FROM THE CONVENOR

The School of Basic Sciences is committed to fostering a culture of curiosity, innovation, and academic excellence. As we embark on another exciting semester, I encourage everyone to explore the wonders of science, collaborate across disciplines, and push the boundaries of knowledge. Let's make the most of the opportunities ahead, whether in the lab, classroom, or beyond. Together, we can achieve remarkable milestones and contribute meaningfully to the scientific community. Wishing you all a productive and inspiring term ahead!



Dr. KAZI HASIBUR
RAHMAN
Assistant Professor
School of Basic Sciences

Editor's Note

TEACHER EDITOR'S

We would like to express our gratitude to the HOD Sir, senior teachers, editorial team members, and article contributors for their contributions to the newsletter's fourth edition in 2025. This newsletter's content includes fascinating articles and the most recent scientific advancements. Being a member of the editorial team is an excellent experience for us. Students are encouraged to develop an engrossing interest in science by this newsletter.



Dr. Sagar Chakraborty

Assistant Professor
School of Basic Sciences



Mr. Tanmoy Pal

Assistant Professor
School of Basic Sciences



Dr. Shilpa Maity


Assistant Professor
School of Basic Sciences

Events

Ph.D. Viva-Voce Examination in Department of Mathematics

29/08/2025

**Ph.D.
Viva – Voce
Examination**



29th August ♦ 12 Noon

➤ Name of Scholar:
Asim Biswas

➤ Subject:
Mathematics

➤ Title of Research:
Solution Of Integral And Differential Equations Using Differential Transform Method And Its Application

➤ Supervisor:
Dr. Subhabrata Mondal

Block NND, Room No. 309A

Organized by:
Department of Mathematics
Swami Vivekananda University

www.swamivivekanandauniversity.ac.in

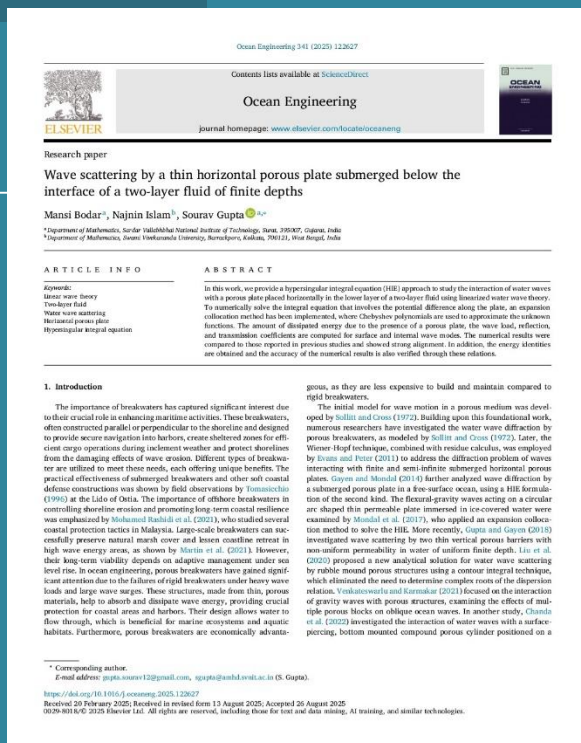


Ph.D. Viva-Voce Examination of Asim Biswas in Department of Mathematics under the supervision of Dr. Subhabrata Mondal.

Articles

WRITE-UPS THAT INSPIRE

A study on the interaction of waves with a submerged vertical elastic plate present in either layer of a two-layer fluid finite depths



Author(s): Najnin Islam, Somdutta Kayal
Souvik Kunduti Biswas
Journal: Ocean Engineering
Publisher : Elsevier
Language : English
Publication Year : 2025
DOI :
<https://doi.org/10.1016/j.oceaneng.2024.117932>
IF : 4.3 (SCI)

DESCRIPTION

The problems of interactions between an elastic plate and surface as well as interface waves are considered and analyzed using the theory of linearized water waves. Considering the ocean's multilayered nature, a two-layered fluid system that serves as the foundation for a more complex multilayered fluid model is examined. It is taken into consideration when an elastic plate is present in either layer of the two-layered water domain. Applying Green's function technique on the boundary value problem related to the flexible plate and its end conditions, an expression of the normal derivative of the potential function is derived. Employing Green's identity on the fundamental potential function and the scattered potential, an alternative expression for the normal derivative of the potential function is obtained.

Impact of biosecurity and immunological memory in curtailing ratio-dependent transmission of anthrax in livestock

Mathematical Medicine and Biology: A Journal of the IMA (2025) **42**, 308–330
<https://doi.org/10.1093/imammb/dqaf006>
 Advance Access publication on 28 July 2025

Impact of biosecurity and immunological memory in curtailing ratio-dependent transmission of anthrax in livestock

PIU SAMUI

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[Received on 3 November 2024; revised on 8 May 2025; accepted on 16 June 2025]

Delineating the dynamics of highly lethal anthrax disease in a biosecured livestock farm and impact of anthrax vaccination is presented through a modified deterministic $SIRBV$ model incorporating nonlinear ratio-dependent disease transmission rate. The basic reproduction number (R_0) of the system is computed and employed to explore the existence and asymptotic stability around the steady states of the system. The system experiences transcritical bifurcation at the disease-free steady state for $R_0 = 1$. Waning of recovery-derived immunity and vaccination-derived immunity trigger backward bifurcation causing reemergence of anthrax in livestock. The dynamical behaviors of the fractional order system express that increased immunological memory will benefit to cut down the eradication time of anthrax transmission from the system. Numerical simulations suggest that appropriate vaccination and comprehensive biosecurity protocols would help to prevent the anthrax transmission and control the disease-induced deaths of cattle.

Keywords: Anthrax disease; stability; transcritical bifurcation; backward bifurcation; immunological memory; vaccination.

1. Introduction

Anthrax, a severe zoonotic disease, has been developed as a biological weapon to deploy the bacterium *Bacillus anthracis* in several countries in the year 1914. After prohibition of biological weapons, anthrax has been used notably in bioterrorism through livestock since the year 1979. According to the World Organisation for Animal Health (WOAH), anthrax emerges in all continents except Antarctica with high mortality affecting the domestic and wild herbivores predominantly including nearly all mammals and birds (WOAH, 2023). Human anthrax is rare but lethal disease with 2000 prevalence cases each year (WHO, 2016). *Bacillus anthracis*, a gram-positive, rod-shaped bacterium, belongs to the Bacillaceae family. The transmission pathways of anthrax are skin (spores entering through broken skin), lungs (spores entering by breathing), intestine (spores entering by eating infected animals) and injection (CDC, 2016). Anthrax is transmitted through close contact among cattle, for instance, direct contact with carcasses, anthrax skin lesions, blood and bodily fluids and ingestion (feed and water). Other possible routes of anthrax transmission are aerosols, contaminated farm environment and contaminated animal products. The common symptoms of anthrax are blisters in skin turning into ulcer with black center.

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Author(s): Piu Samui, Sima Mandal, Jayanta Mondal

Journal: Mathematical Medicine and Biology: A Journal of the IMA

Publisher : Oxford University Press

Language : English

Publication Year : 2025

DOI : <https://doi.org/10.1093/imammb/dqaf006>

IF : 1.5 (SCI)

DESCRIPTION

Delineating the dynamics of highly lethal anthrax disease in a biosecured livestock farm and impact of anthrax vaccination is presented through a modified deterministic $SIRBV$ model incorporating nonlinear ratio-dependent disease transmission rate. The basic reproduction number (R_0) of the system is computed and employed to explore the existence and asymptotic stability around the steady states of the system. The system experiences transcritical bifurcation at the disease-free steady state for $R_0 = 1$. Waning of recovery-derived immunity and vaccination-derived immunity trigger backward bifurcation causing reemergence of anthrax in livestock. The dynamical behaviors of the fractional order system express that increased immunological memory will benefit to cut down the eradication time of anthrax transmission from the system.