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Topic: Postdoc Seminar 2021
Meeting ID: 938 1218 6938
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August 9–23, 2021 | 1:00-3:00 PM.

Contents

Program Timetable

Postdoc Seminar Program Timetable

August 9, 2021

01.00 – 01.30 PM	**Dr. Abubakar Adamu** ▷ Approximation Methods for Inclusion Problems in Real Banach Spaces with Applications
01.30 – 02.00 PM	**Dr. Konrawut Khammahawong** ▷ Iterative Algorithm for Singularities of Inclusion Problems in Hadamard Manifolds

August 16, 2021

02.00 – 02.30 PM	**Dr. Aliyu Muhammed Awwal** ▷ Inertial–type Projection Method for Solving Convex Constrained Monotone Nonlinear Equations With Application in Robotic Motion Control
02.30 – 03.00 PM	**Dr. Auwal Bala Abubakar** ▷ New hybrid three-term spectral-conjugate gradient method for finding solutions of nonlinear monotone operator equations with applications

August 23, 2021

01.00 – 01.30 PM	**Dr. Anwar Saeed** ▷ Influence of Cattaneo–Christov Heat Flux on MHD Jeffrey, Maxwell, and Oldroyd-B Nanofluids with Homogeneous-Heterogeneous Reaction
01.30 – 02.00 PM	**Dr. Printaporn Sanguansuttigul** ▷ An Optimal Control Technique for Epidemiological Model with Limited Vaccination Supply

Abstracts

Approximation Methods for Inclusion Problems in Real Banach Spaces with Applications

A. Adamu*, D. Kitkuan, A. Padcharoen, C.E. Chidume and P. Kumam

*presenting author.
email: aadamu@aust.edu.ng

Abstract

Monotone operators are essential to modern optimization and fixed point theory. Interest in the study of monotone operators stems mainly from their firm connection with optimization problems. In a real Hilbert space H, a fundamental problem in the study of monotone operators is the following:

$$\text{find} \quad u \in H \quad \text{such that} \quad 0 \in (A+B)u \quad \text{and} \quad Tu = u, \tag{1}$$

where A and B are single-valued and multi-valued monotone operators, respectively, on H and T is a nonexpansive operator on H.

Numerous problems of interest in nonlinear analysis (for example, variational inequality problems, split feasibility problems, convex minimization problems and equilibrium problems) can be transformed into the inclusion problem (1). In applications, some concrete problems arising from image recovery and signal processing can be modeled as the inclusion problem (1).

In this seminar, we will give a talk on the recent developments and improvements on iterative methods for approximating solutions of the inclusion problem (1) in real Banach spaces more general than real Hilbert spaces. Furthermore, we will talk about our contributions to the literature on the study of the inclusion problem (1) in real Banach spaces.

Keywords: $J-$Fixed point, Inclusion problems, Image restoration, Signal recovery

Iterative Algorithm for Singularities of Inclusion Problems in Hadamard Manifolds

Parin Chaipunya, Konrawut Khammahawong* and Poom Kumam

*presenting author.
email: k.konrawut@gmail.com

Abstract

The main purpose of this paper is to introduce a new iterative algorithm to solve inclusion problems in Hadamard manifolds. Moreover, applications to convex minimization problems and variational inequality problems are studied. A numerical example also proposes to support our main theorem.

Keywords: Hadamard manifolds, Inclusion problems, Inverse-strongly-monotone vector field, Maximal monotone vector field

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Inertial–type Projection Method for Solving Convex Constrained Monotone Nonlinear Equations With Application in Robotic Motion Control

Aliyu Muhammed Awwal*

*presenting author.
email: aliyumagsu@gmail.com

Abstract

We present two derivative–free projection iterative algorithms for solving a system of nonlinear monotone operator equations. The two proposed algorithms can be viewed as two–step methods where the first step uses an inertial effect in every iteration. Global convergence of the proposed algorithms is established under some mild assumptions. We present numerical experiments to show the efficiency and advantage of the inertial projection steps of the proposed algorithms compare it with some existing methods for solving nonlinear problems. Finally, we apply the new algorithms to solve a motion control problem involving a two–joint planar robotic manipulator.

Keywords: Inertial method; Nonlinear monotone equations; Projection technique; Motion control problem

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New hybrid three-term spectral-conjugate gradient method for finding solutions of nonlinear monotone operator equations with applications

Auwal Bala Abubakar* , Poom Kumam, Abdulkarim Hassan Ibrahim, Parin Chaipunya and Sadiya Ali Rano

*presenting author.
email: ababubakar.mth@buk.edu.ng

Abstract

In this paper, we present a new hybrid spectral-conjugate gradient (SCG) algorithm for finding approximate solutions to nonlinear monotone operator equations. The hybrid conjugate gradient parameter has the Polak–Ribière–Polyak (PRP), Dai-Yuan (DY), Hestenes-Stiefel (HS) and Fletcher-Reeves (FR) as special cases. Moreover, the spectral parameter is selected such that the search direction has the descent property. Also, the search directions are bounded and the sequence of iterates generated by the new hybrid algorithm converge globally. Furthermore, numerical experiments were conducted on some benchmark nonlinear monotone operator equations to assess the efficiency of the proposed algorithm. Finally, the algorithm is shown to have the ability to recover disturbed signals.

Keywords: Non-linear equations, Conjugate gradient, Projection map, signal recovery.

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Influence of Cattaneo–Christov Heat Flux on MHD Jeffrey, Maxwell, and Oldroyd-B Nanofluids with Homogeneous-Heterogeneous Reaction

Anwar Saeed* , Zahir Shah and Poom Kumam

*presenting author.
email: anwarsaeed769@gmail.com

Abstract

This research article deals with the determination of magnetohydrodynamic steady flow of three combine nanofluids (Jefferey, Maxwell, and Oldroyd-B) over a stretched surface. The surface is considered to be linear. The Cattaneo–Christov heat flux model was considered necessary to study the relaxation properties of the fluid flow. The influence of homogeneous-heterogeneous reactions has been taken in account. The modeled problem is solved analytically. The impressions of the magnetic field, Prandtl number, thermal relaxation time, Schmidt number, homogeneous–heterogeneous reactions strength are considered through graphs. The velocity field diminished with an increasing magnetic field. The temperature field diminished with an increasing Prandtl number and thermal relaxation time. The concentration field upsurge with the increasing Schmidt number which decreased with increasing homogeneous-heterogeneous reactions strength. Furthermore, the impact of these parameters on skin fraction, Nusselt number, and Sherwood number were also accessible through tables. A comparison between analytical and numerical methods has been presented both graphically and numerically.

Keywords: Magnetohydrodynamic (MHD), Jefferey, Maxwell and Oldroyd-B fluids, Cattaneo–Christov heat flux, homogeneous–heterogeneous reactions, analytical technique, Numerical technique

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An Optimal Control Technique for Epidemiological Model with Limited Vaccination Supply

Printaporn Sanguansuttigul*, Parin Chaipunya and Poom Kumam

*presenting author.
e-mail: printaporn.ps@mail.kmutt.ac.th

Abstract

The main purpose of this paper is to introduce optimal control techniques, it is possible to find the vaccination schedule that minimizes the number of infectious individuals and the overall cost of the vaccination during a fixed time. Our model incorporates vaccination efficacy and allows for a post-vaccinated infection, which is dramatically less severe so that hospitalization is not required. Moreover, the age-group structure is also taken into account to capture the different social behaviors affected in the spread of disease.

Keywords: Optimal control, SEIR Model.

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Notes