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Special Issue on

**Mathematical Frontiers : Exploring Advances in
Differential Equations, Analysis, and Computational
Methods**

Guest Editors

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FOREWORD

Titled “Mathematical Frontiers : Exploring Advances in Differential Equations, Analysis, and Computational Methods” this special issue explores the intricate network linking mathematical ideas with their many useful applications. This problem spans several mathematical disciplines, each adding to the great fabric of human knowledge and invention.

Differential equations, numerical analysis, and optimization define this problem fundamentally. These fields investigate the subtleties of numerical methods, differential equation solutions, and optimization strategies necessary to solve practical challenges. We examine theoretical and practical consequences of mathematical structures using Real, Functional, and Complex Analysis.

Conversations on algebra, topology, and geometry highlight the grace of algebraic structures, topological spaces, and geometric ideas thereby enhancing the mathematical terrain. Emphasizing computational techniques and their pragmatic uses across several disciplines, this issue also covers Applied and Computational Mathematics.

Dedicated to the developing discipline of Fractional Differential Equations, this special part clarifies the theory and useful applications that have made this topic a major focus of contemporary mathematical investigation. Examining fuzzy logic’s function in controlling uncertainty and decision-making, Fuzzy Logic and Its Applications shows its adaptability.

We underline the need of mathematical modeling and probability theory in building meaningful models and comprehending difficult systems. After that, top authorities on mathematical applications provide State-of- the-Art of Mathematical Applications addressing the most recent developments responsible for changing science and engineering.

While mathematical models and applications show the flexibility of mathematical constructions in addressing real-world problems, applied mathematics and number theory bridge theoretical discoveries with practical applications. Crucially important for data representation and

technological communication, information theory and signal processing are also closely investigated.

Going back to the foundations, we investigate the ideas of functions and equations. The last part covers Information and Graph Theory, stressing their indispensable functions in network research and data representation.

We sincerely thank all the authors for their intelligent contributions, which help us to better grasp mathematics and its useful applications. This special issue shows the crucial part mathematics plays in pushing the envelope of mathematical research and its applications.

For this special issue, we received a total of 67 paper submissions from researchers around the globe, reflecting a wide range of innovative ideas in Mathematical Frontiers : Exploring Advances in Differential Equations, Analysis, and Computational Methods. After a rigorous peer-review process, which ensured that each paper met the highest standards of quality and relevance, 48 papers were accepted for publication. This acceptance rate highlights our commitment to maintaining excellence in the research we publish, ensuring that only the most impactful and significant contributions are included in this special issue. We are proud to present these selected papers, which represent the forefront of advancements in this field.

Guest editors especially thank Prof. B. K. Dass, Chief Editor who supported us in bringing out the special issue entitled “**Mathematical Frontiers : Exploring Advances in Differential Equations, Analysis, and Computational Methods**” in the esteemed *Journal of Interdisciplinary Mathematics* published by Taru Publications, New Delhi.

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CONTENTS

M. A. SHAREEF AND H. A. SHUBBER Some properties of intuitionistic fuzzy n -binormal operator on IFH-space	619–623
N. K. ABDULLAH Semi-complement Co-Hopfian R -mods	625–633
S. S. MAHDI AND E. S. BHAYA Enhancing L_p approximation via dual hidden layers in neural networks	635–641
W. H. HANOON, A. M. DARWEESH, W. G. ATSHAN AND S. D. THEYAB Some properties of analytic univalent functions group	643–647
W. M. RAOOF AND L. S. ABDALBAQI Supra v -open set and some of its properties	649–654
D. H. ALLAWI AND M. A. K. SHIKER A modified technique of spectral gradient projection method for solving nonlinear equations systems	655–665
G. A. HUSSEIN AND Z. D. AL-NAFIE Regularity and normality of nano topological spaces modeled by pre-open sets structures	667–673
M. A. KADHIM, A. B. YAZDANI AND M. S. MECHEE Generalized RKM methods for solving classes of fourth-order fractional partial differential equation	675–683
M. Y. MOHSIN AND D. W. AL-BAYDLI Fuzzy cofibration and fuzzy Serre cofibration	685–690
W. A. AJEL AND E. S. BHAYA Negative theorem for r -monotone approximation	691–697

F. S. FADHEL, H. O. ALTAIE AND Q. J. HUSSEIN Approximate analytical solutions of fractional order differential equations by conformable Sumudu decomposition method	699–704
A. M. F. AL-JUMAILI New generalizations of soft sets in soft topological spaces and their applications	705–713
H. O. ALTAIE, A. R. A. ALI AND R. W. HUISEN Semi-analytical iteration techniques for solving differential equations	715–719
S. A. AL-AMEEDEE, M. B. H. AL-HAKEEM AND A. K. H. ALGHAFIL Fekete-Szego inequalities for higher-order derivatives of multivalent analytic function with application to stealth combat aircraft	721–727
M. A. KADHIM, A. B. Y. CHERATI AND M. S. MECHEE The numerical solutions for a class of fifth-order partial differential equations via generalized RKM methods	729–735
A. M. ABED, H. JAFARI AND M. S. MECHEE Some numerical methods for solving fractional partial difference equations in the discrete domain	737–743
E. A. DAWOOD AND Y. Y. YOUSIF Fibrewise locally micro sliceable and fibrewise locally micro-section able micro-topological space	745–752
S. E. ALI AND M. A. A. AL-YASEEN Expansivity and shadowing in fuzzy metric space	753–760
A. M. MOHAMMED AND H. O. ALTAIE Analytical solutions via coupled Elzaki adomian decomposition method for some applications	761–766
A. M. MOHAMMED AND H. O. ALTAIE Elzaki transform decomposition approach to solve Riccati matrix differential equations	767–773
O. ABBAS AND H. O. ALTAIE Laplace transform-adomian decomposition approach for solving random partial differential equations	775–780
Z. M. ALWAN Solution homogeneous and non-homogeneous fractional ordinary differential equations by ZMA-transform	781–785
H. S. HABIB AND M. A. K. SHIKER A modified (CG) method for solving nonlinear systems of monotone equations	787–792

S. J. HAMAAD, A. R. S. JUMA AND H. H. EBRAHIM Subclass of bi-starlike function associated with touchard polynomials	793–797
M. D. JASIM Deriving a new centrodal Runge Kutta method with predictor corrector style	799–805
M. I. HAMEED, S. J. AL-DULAIMI AND H. JOSHUA Novel classes of bi-univalent functions of the Sălăgean type with a modified sigmoid unit action function	807–814
A. H. IBRAHIM Inverse approximation theorem using Bernstein's Durrmeyer operator in terms of 2nd modulus of smoothness	815–819
R. O. RASHEED The Raducanu-Orhan operator associated with subclass of meromorphic bi-univalent functions	821–826
Y. Y. YOUSIF AND N. A. HUSSEIN α -connected fibrewise topological spaces	827–834
E. JAWAD Some properties of the first-order partial differential equation in the spaces V_α and L_p	835–841
A. G. JASIM, A. A. SANGOOR, A. S. MOHAMMED, T. H. DAHESS AND A. H. KAMIL Common fixed point theorem in fuzzy Fréchet space	843–847
M. D. JASIM A new parallel Heronion Runge Kutta mean method by using forward backward technique	849–855
O. A. SALMAN AND H. O. ALTAIE Solutions of random ordinary differential equations with laplace transform - Adomian decomposition method	857–863
H. O. MUSLIM AND A. J. MOHAMMAD Approximation by half Bernstein polynomials	865–869
M. K. A. AL-RAHEM Modeling and simulating crowd dynamics in the Ziyarte al-Arba'een : A fluid-stochastic-network approach	871–879
S. J. AL-DULAIMI, M. I. HAMEED AND I. I. HAMEED Results of third order differential subordination for holomorphic functions	881–886
N. F. SARAY AND A. R. S. JUMA On bi-univalent functions of quasi-subordination associated with convolution operator	887–895

O. S. ERZIG, A. R. S. JUMA AND A. AL-FAYADH On $H_3(1)$ Hankel determinant for starlike and convex functions associated with exponential function	897–905
O. A. SALMAN AND H. O. ALTAIE Analytical approximate solutions of random integro differential equations with laplace decomposition method	907–912
A. S. SLEIBI AND S. Q. HASAN Stability of Caputa–Katugampola fractional differential nonlinear control system with delay Riemann–Katugampola	913–921
A. R. SADEK Nano M. and nano IM. sets in nano topological spaces	923–932
S. M. A. ALZAHRA AND F. A. AL-MAAMORI Studying the upper bound of Beurling zeta function in the strip (0,1)	933–938
M. A. JASIM AND Z. E. ABDULNABY Some certain properties on analytic p-valent functions connected to fractional differential operator	939–945
S. A. AL-AMEEDEE, H. A. AHMED AND A. J. OBAID Differential subordinations of meromorphic multivalent harmonic functions	947–952
J. H. EIDI, E. M. HAMEED AND J. R. KIDER Convex fuzzy distance between two convex fuzzy compact set	953–963
A. K. O. AL-JUBORY, A. W. ALI AND H. A. R. AL-ABEDI Approximate approach for solving pantograph type via Genocchi polynomials	965–973
M. NADJAFIKHAH AND H. AL-BDERI Lie symmetry analysis of a TFD system for transmission of HTVL virus type I to human CD4+ T-cells	975–990
A. J. ABDULQADER, R. B. ABDULMAGED AND B. M. ABDALI Numerical solution for solving nonlinear Volterra-Fredholm system by using iterative techniques	991–1000