

PREFACE TO THE EDITION

It is with great pleasure that we present the forthcoming issue of the **International Journal of Pure Science Research Studies (IJPSRS)**, a collection that reflects the expanding frontiers of contemporary scientific inquiry and the enduring pursuit of fundamental knowledge across the natural sciences, mathematics, and computational research. The articles featured in this issue collectively demonstrate the dynamic interplay between theoretical foundations, technological advancement, and global scientific challenges, highlighting the essential role of pure science in shaping future innovation and understanding.

The issue opens with an insightful review on coral reef biodiversity and thermal bleaching responses under climate change, addressing one of the most urgent environmental crises of the modern era. By examining the biological and ecological mechanisms underlying coral bleaching, the study presents a comprehensive synthesis of climate-driven reef degradation and emphasizes the necessity of coordinated conservation and climate mitigation strategies for the preservation of marine ecosystems.

Advancing into the domain of computational and mathematical sciences, the issue includes a rigorous exploration of graph neural networks and their mathematical foundations. The article provides a valuable analytical overview of graph-based deep learning architectures, bridging graph theory, spectral analysis, and artificial intelligence. Its discussion of expressive power, message-passing frameworks, and emerging higher-order extensions reflects the growing significance of graph-based machine learning in scientific and industrial applications.

The remarkable progress of modern astrophysics is represented through a detailed review of gravitational wave astronomy. Tracing the evolution of the field from the first LIGO detection to contemporary multi-messenger astronomy, the paper examines both the technological sophistication of interferometric detectors and the profound astrophysical implications of gravitational-wave observations. The discussion of future observatories and cosmological applications demonstrates the transformative impact of this emerging observational science.

This issue also presents a comparative study of numerical methods for nonlinear partial differential equations, an area central to scientific computing and mathematical modelling. Through analytical and computational comparisons of finite difference, finite element, and spectral methods, the article offers meaningful guidance for researchers engaged in solving complex nonlinear systems encountered across physics, engineering, and applied mathematics.

Completing the volume is a comprehensive review of quantum entanglement and its applications in quantum information science. By connecting foundational quantum theory with cutting-edge developments in quantum communication, computation, and cryptography, the article illustrates how one of the most intriguing concepts in modern physics has evolved into a cornerstone of next-generation technologies.

Taken together, the contributions in this issue reflect the interdisciplinary vitality of pure science research and its continuing capacity to address both foundational questions and contemporary global challenges. The studies presented herein not only deepen scientific understanding but also encourage future investigations that transcend disciplinary boundaries and foster collaborative innovation.

The editorial team of International Journal of Pure Science Research Studies (IJPSRS) extends sincere appreciation to all authors, reviewers, editors, and academic contributors whose dedication and scholarly commitment have made this issue possible. We hope that the research published in this volume will inspire meaningful academic dialogue, stimulate further discovery, and contribute significantly to the advancement of scientific knowledge worldwide.

Dr. Sandhya E
Chief editor

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