AI Based Analysis and Partial Differential Equations

M. Krishna Reddy[1] and N. Vijayabhaskar Reddy[2]

Department of Mathematics

Government College for Men, Cluster University, B-Camp, Kurnool, Andhra Pradesh, India[1]

Government Degree College, Kukatpally, Hyderabad, India[2]

Abstract*: The intersection of artificial intelligence (AI) and partial differential equations (PDEs), emphasizing how AI techniques can revolutionize the analysis and solution of PDEs in various scientific and engineering applications. Traditional methods for solving PDEs often face challenges related to computational complexity, high-dimensionality, and nonlinearity. By leveraging advanced AI algorithms, particularly deep learning and neural networks, we propose novel approaches to approximate solutions, reduce computational costs, and handle complex boundary conditions more effectively. The study highlights the advantages of AI-driven methods in terms of accuracy, efficiency, and scalability, presenting case studies from fluid dynamics, quantum mechanics, and financial mathematics. Our findings suggest that AI has the potential to significantly enhance the analytical capabilities and practical applications of PDEs, paving the way for new advancements in both theoretical research and real-world problem solving.*

Keywords: Artificial Intelligence, Partial Differential Equations, Deep Learning, Neural Networks, Computational Complexity, High-Dimensionality, Nonlinearity, Fluid Dynamics