

Applications of Fixed Point Theory in Mathematical Modeling and Optimization

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Abstract: *In many areas of mathematics, fixed point theory is an essential component that offers vital resources for understanding and solving complex problems in mathematical modeling and optimization. The applications of fixed point theorems, such as those of Banach and Brouwer, in a variety of disciplines, including biology, engineering, and economics, are examined in this paper. The paper demonstrates how fixed point results help ensure that solutions to nonlinear equations and systems exist and are unique, which strengthens mathematical models. The paper also explores optimisation difficulties, showing how optimal solutions in iterative algorithms and dynamic systems can be derived using fixed points. This paper emphasises the adaptability of fixed point theory as a potent tool for tackling current issues in mathematical modelling and optimisation by looking at case studies and practical applications. The results emphasise how crucial it is to include fixed point ideas into different analytical frameworks in order to enhance theoretical understanding and solution approaches.*

Keywords: Fixed Point Theory, Mathematical Modeling, Optimization Techniques, Equilibrium Analysis, Iterative Algorithms