

**COMPARISON OF QUADRATIC TRIGONOMETRIC
B-SPLINE AND CUBIC B-SPLINE IN DESIGNING OBJECTS**

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ABSTRACT

Choosing the right spline algorithm significantly influences the quality and efficiency of the design process in CAGD. Designers and engineers often face difficulties in selecting between different spline techniques due to their specific benefits and drawbacks. This research aims to bridge this gap by evaluating the performance of Quadratic Trigonometric B-Spline (QTBS) and Cubic B-Spline (CBS) in resolving specific design issues using *Wolfram Mathematica* software. The study begins by exploring the methods employed by QTBS and CBS for two-dimensional curve, assessing their ability to generate desired shapes with supreme smoothness. The research extends into three-dimensional surface design, analysing the capabilities of QTBS and CBS in crafting three-dimensional surfaces of an object using Sweep surface method with controlled curvature and flawless continuity. The paper demonstrates the advantages and disadvantages of each approach for handling design difficulties by a thorough analysis of the mathematical models and real-world applications. By designing curves of an object using *Wolfram Mathematica*, the study integrates an interactive application for both methods to demonstrate the curve behaviour by modifying the shape parameters and control points of the objects. The integration of QTBS and CBS in CAGD enhances the designer's ability to create sophisticated and accurate geometric models. The final phase of the study focuses on determining the most effective B-spline method for enhancing smoothness in both two-dimensional and three-dimensional spaces which is QTBS method.

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