

Best Approximation in Inner Product Spaces: A Conversational Mathematical Memoir

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Inner Product Space in Fourier Approximation
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Abstract
Let \mathcal{H} be an infinite real Banach space. A Banach space of approximating functions in \mathcal{H} which is an ideal of \mathcal{H} is called an ideal of \mathcal{H} if it is such that $\|f\cdot g\| \leq \|f\| \cdot \|g\|$ for all $f, g \in \mathcal{H}$. This work deals with the Fourier approximation method, using the inner product space technique about approximation of functions. The Fourier approximation is obtained by using another specialized square approximation. Define an inner product function $\langle f, g \rangle = \int_{\Omega} f(x)g(x)dx$ by the equation

$$\langle f, g \rangle = \int_{\Omega} f(x)g(x)dx \text{ and } \|f\|^2 = \int_{\Omega} |f(x)|^2 dx.$$

In general, the definition of orthogonal function $\langle f, g \rangle = 0$ if and only if the integral $\int_{\Omega} f(x)g(x)dx = 0$.

The main objective of orthogonal projection, best approximation, square approximation and Fourier approximation in inner product space and orthogonal projection, an application of Fourier approximation, namely Fourier approximation is discussed.

Keywords: Fourier Approximation
Orthogonal Functions

In this paper, several topics are needed to solve problems related to Banach spaces and Banach algebras which subsequently yields "orthogonal" basis, Fourier series of approximation in mathematical analysis and its connection to general concepts in geometry. Main problem in the physical sciences and engineering is about the approximation of functions. The algebraic function $f: \mathbb{R} \rightarrow \mathbb{R}$ is usually given from a given function $g: \mathbb{R} \rightarrow \mathbb{R}$ where $g(x)$ is the linear function of all conditions, and $g'(x) = 1$.

Definition of Terms

2.1. Vector Space: Let V be a set of which two operations (real addition and vector multiplication) are defined. If the following axioms are satisfied, then every x and y in V and every scalar c then V is called a vector space.

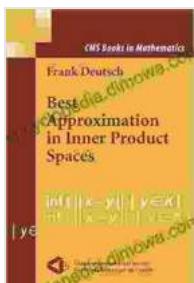
$x + y \in V$
 $x + (y + z) = (x + y) + z$
 $x + 0 = x$ for every $x \in V$
For every x there exists y such that $x + y = 0$
For every x there exists a unique y denoted by $-x$ such that $x + (-x) = 0$
 $c \in \mathbb{R}, x \in V$
 $c(x + y) = cx + cy$
 $c(cx) = (c^2)x$
 $(c + d)x = cx + dx$

2.2. Inner Product Space: International Journal of Engineering Sciences & Research Technology
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- Linear subspaces and orthogonal projections
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These examples and applications help readers appreciate the practical relevance of the theory and gain a deeper understanding of its potential.

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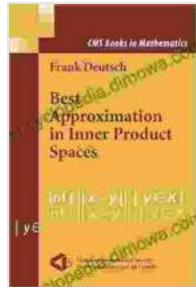
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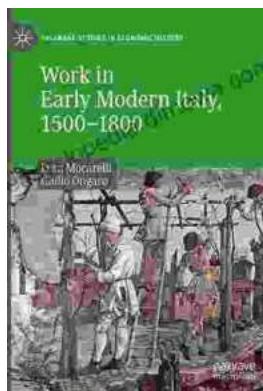
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