GIQ **32** (2025) 33–46

SERIES ON
Geometry, Integrability and Quantization
ISSN 1314-3247

ON A PARTICULAR TYPE OF SPACE-LIKE ROTATIONAL HYPERSURFACES IN PSEUDO-EUCLIDEAN 4-SPACE $\mathbb{E}_2^4$

ERHAN GÜLER, YUSUF YAYLI and HASAN HILMI HACISALIHOĞLU

Communicated by Mayeul Arminjon

In this study, a particular type of rotational hypersurface, is examined within the framework of the four-dimensional pseudo-Euclidean space $\mathbb{E}_2^4$. The curvatures of the hypersurface are formulated. Furthermore, the associated Laplace-Beltrami operator is computed, and it is demonstrated that the hypersurface satisfies the eigenvalue equation $\Delta\mathbf{x} = \mathcal{A}\mathbf{x}$, where $\mathcal{A}$ is a constant 4×4 matrix.

MSC: 53A35, 53C50
Keywords: Curvature, four-dimension, Laplace-Beltrami operator, pseudo-Euclidean space, rotational hypersurface

Contents

1. Introduction

An isometric immersion (M, x) into Euclidean space is called finite type if the position vector field $x\colon M \longrightarrow \mathbb{E}^m$ can be decomposed into a finite sum of eigenfunctions of the Laplacian Δ on M, that is, $x = x_0 + \sum_{i=1}^{k} x_i$, where x_0 is a constant map, $x_1, x_2, \ldots, x_k$ are non-constant maps satisfying $\Delta x_i = \lambda_i x_i$ for some $\lambda_i \in \mathbb{R}$,

doi: 10.7546/giq-32-2025-33-46