ON THE PARALLEL SURFACES IN GALILEAN SPACE

Mustafa Dede a *, Cumali Ekici b † and A. Ceylan Çöken c ‡

Received 22 : 02 : 2012 : Accepted 11 : 08 : 2012

Abstract

In this paper, first of all, the definition of parallel surfaces in Galilean space is given. Then, the relationship between the curvatures of the parallel surfaces in Galilean space is determined. Moreover, the first and second fundamental forms of parallel surfaces are found in Galilean space. Consequently, we obtained Gauss curvature and mean curvature of parallel surface in terms of those curvatures of the base surface.

Keywords: Parallel surfaces, Surface curvature, Galilean space

2000 AMS Classification: 53A35, 53Z05

1. Introduction

It is known that two surfaces with a common normal are called parallel surfaces. A large number of papers and books have been published in the literature which deal with parallel surfaces in both Minkowski space and Euclidean space such as [1, 4, 6, 7, 12, 13, 15]. However, this paper presents the differential properties of the parallel surfaces in three-dimensional Galilean space.

There are nine related plane geometries including Euclidean geometry, hyperbolic geometry and elliptic geometry. Galilean geometry is one of these geometries whose motions are the Galilean transformations of classical kinematics [16]. Differential geometry of the Galilean space \( \mathbb{G}_3 \) and especially the geometry of ruled surfaces in this space have been largely developed in O. Röschel’s paper [14]. Some more results about ruled surfaces in \( \mathbb{G}_3 \) have been given in [8, 9, 10]. A. Öğrenmiş et al. obtained the characterizations of helix for a curve with respect to the Frenet frame in Galilean space [11]. In [3], curves...