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AN EXAMINATION OF PERPENDICULAR INTERSECTIONS OF BFRS AND MFRS IN E^3

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Abstract. We already have defined and found the parametric equations of Frenet ruled surfaces which are called Bertrandian Frenet Ruled Surfaces (BFRS) and Mannheim Frenet Ruled Surfaces (MFRS) of a curve α, in terms of the Frenet apparatus. In this paper, we find a matrix which gives us all sixteen positions of normal vector fields of eight BFRS and MFRS in terms of the Frenet apparatus. Further using the orthogonality conditions of the eight normal vector fields, we give perpendicular intersection curves of the eight BFRS and MFRS.

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1. Introduction

The surface-surface intersection (SSI) problems can be cast as three types: parametric-parametric, implicit-implicit, parametric-implicit. The SSI is called transversal if the normal vectors of the surfaces are linearly independent or The SSI is called tangential if the normal vectors of the surfaces are linearly dependent at the intersecting points. In transversal intersection problems, the tangent vector of the intersection curve can be found easily by the vector product of the normal vectors of the surfaces. Because of this, there are many studies related to the transversal intersection problems in the literature on differential geometry. There also are some studies about tangential intersection curve and its properties. Some of these studies are mentioned below. Wu, Alessio and Costa [16], using only the normal vectors of two regular surfaces, present an algorithm to compute the local geometric properties of the transversal intersection curve. Tangential intersection of two surfaces are examined in [1]. We have already try to derive a surface based on the other surface by using the similar method to derive curves based on the other curves which is very interesting subject in geometry. The involute-evolute curves, Bertrand curves are such kind of curves. We produce a new ruled surface based on the other ruled surface which are called involute $\tilde{D}$-scroll that were examined in [15]. In this paper we consider the following four special ruled surfaces associated to a space curve