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PLANAR P-ELASTICAE AND ROTATIONAL LINEAR WEINGARTEN SURFACES

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Abstract. We variationally characterize the profile curves of rotational linear Weingarten surfaces as planar p-elastic curves. Moreover, by evolving these planar p-elasticae under the binormal flow with prescribed velocity, we describe a procedure to construct all rotational linear Weingarten surfaces, locally. Finally, we apply our findings to two well-known family of surfaces.

MSC: 53A04, 53C42, 53C44
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1. Introduction

The purpose of the present work is to present some results included in the works [2, 3, 12] and [16]. Here, ideas and arguments are only sketched while proofs are omitted. Interested readers are referred to [2, 3, 12] or [16], respectively, for a complete and more general treatment.

In classical Differential Geometry of surfaces, the intrinsic information of a surface, S, is encoded in the *first fundamental form*. On the other hand, for a surface immersed in the Euclidean three-space $\mathbb{R}^3$, the most important extrinsic invariant is, probably, the *mean curvature*, H, which can be computed with the aid of the *second fundamental form*. Moreover, the combination of these two fundamental forms of the immersion of S into $\mathbb{R}^3$ gives rise to the *shape operator*. The shape operator is symmetric (and, therefore, diagonalizable) and its eigenvalues are usually called *principal curvatures*.

Now, it can be checked that the mean curvature, H, verifies $2H = \kappa_1 + \kappa_2$, κ_1 and κ_2 being the principal curvatures. In [3], constant mean curvature (from now on CMC) invariant surfaces in any Riemannian or Lorentzian three-space form