

1023-53-1839

Adam G. Weyhaupt* (aweyhau@siue.edu), Department of Mathematics and Statistics,
Southern Illinois University Edwardsville, Edwardsville, IL 62026. *Deformations of the gyroid and
Lidinoïd minimal surfaces.*

Meeks discovered in 1975 a 5-parameter family of genus 3 embedded triply periodic minimal surfaces (ETPMS) that contained all known examples of genus 3 ETPMS except the gyroid. A second example lying outside the Meeks family was proposed by Lidin in 1990. In a series of investigations the scientists, Lidin, et. al., numerically indicate the existence of two 1-parameter families of ETPMS of genus 3 that contain the gyroid and one family that contains the Lidinoïd. We prove that these families exist by using the flat structure method. We describe the Riemann surface structure of the minimal surface using branched covers of (non-rectangular) tori. The holomorphic 1-forms Gdh , $\frac{1}{G}dh$, and dh each place a cone metric on the torus; we develop the torus with this metric into the Euclidean plane and describe the periods in terms of these flat structures. Using this description of the periods, we define moduli spaces for the horizontal and vertical period problems so that Weierstraß data (X, G, dh) solves the period problem if the flat structures of X induced by these 1-forms are in the moduli spaces. To show that there is a curve of suitable data, we use an intermediate value type argument and do explicit computations with Dehn twists. (Received September 27, 2006)