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**Deformations of the gyroid and Lidinoid minimal surfaces using flat structures** ADAM WEYHAUPT, Southern Illinois University Edwardsville — Mathematically, the challenge in proving the existence of a purported triply periodic minimal surface is in computing parameter values that depend on a system of equations defined by elliptic integrals. This is generally very difficult. In the presence of some symmetry, however, a technique developed by Weber and Wolf can reduce these elliptic integrals to basic algebra and geometry of polygons. These techniques can easily prove the existence of some surfaces and the presence of a family of solutions. Families of surfaces are important mathematically, but recent work by Seddon, et. al., experimentally confirms that these families of surfaces can occur physically as well. In this talk, we give a brief overview of the technique and show how it can be applied to prove the existence of several families of surfaces, including lower symmetry variants of the gyroid and Lidinoid such as the rG, rPD, tG, and rL. We also conjecture a map of the moduli space of triply periodic minimal surfaces of genus 3.

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