

Minimal surfaces exercises

Lecture 3

- A catenoid is a minimal surface that is rotationally symmetric, proper, and non-planar. Find a formula for a catenoid. Are all catenoids equivalent up to rescaling (and translation and rotation)?
- Let S be a surface with boundary in \mathbb{R}^3 . Use the generalized divergence theorem to show

$$2\text{Area}(S) = \int_{\partial S} \langle X, n \rangle ds$$

where n is the outward normal of ∂S and X is the (restriction to ∂S of) the vector field on \mathbb{R}^3 defined by $X(x_1, x_2, x_3) = [x_1, x_2, x_3]$.

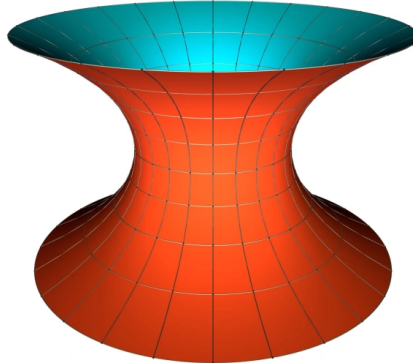


Figure 1: Catenoid