Lehrstuhl für Statik und Dynamik
Prof. Dr. –Ing. R. Wüchner
Arcisstr. 21, 80333 München

Master‘s Thesis:

Critical Distances for Minimal Surfaces

Figure 1 illustrates the relationship between the height of a cylinder (with radius $R = 1$) and the surface area of the corresponding catenoid, which represents the minimal surface. The critical height for such a cylinder is $H \approx 1.325$. For cylinders taller than this critical height, the minimal surface is no longer a catenoid but instead consists of two separate coaxial circular boundaries.

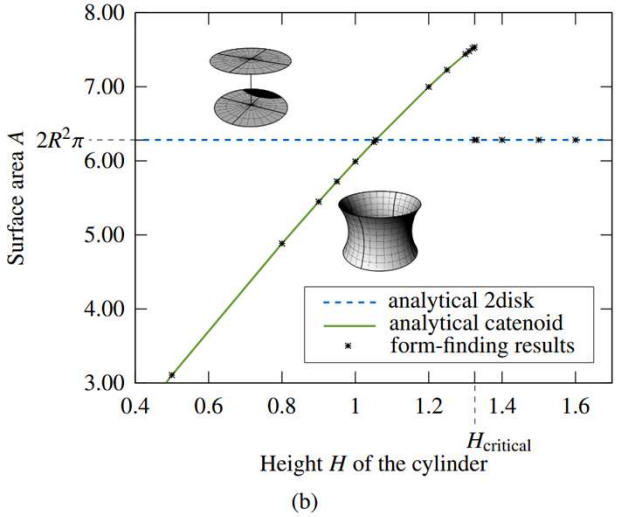

Fig. 1: Form finding of a catenoid when starting with a Cylinder[1] .

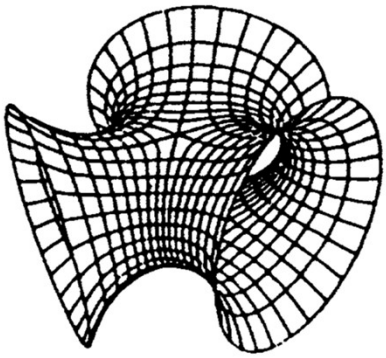

Fig. 2: The Jorge–Meeks catenoid [2] .

The goal of this thesis is to investigate whether a similar relationship can be identified for a broader class of problems—specifically, minimal surfaces bounded by cylindrical edges on a sphere. A representative example of this class is the Jorge–Meeks catenoid, as shown in Figure 2. To explore this, numerical form-finding tools will be employed to conduct a comprehensive study of the behavior of these minimal surfaces under varying geometric constraints.

A strong background in structural analysis, geometric modeling, and mathematics is essential for undertaking this thesis.

[1] Philipp, B., et al. "Integrated design and analysis of structural membranes using the Isogeometric B-Rep Analysis." *Computer Methods in Applied Mechanics and Engineering* 303 (2016): 312-340.

[2] Dierkes, Ulrich, et al. "Minimal surfaces." *Minimal Surfaces I: Boundary Value Problems*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2010. 53-88.

Betreuung: Luzius Moll
Luzius.moll@tum.de

Sprache: deutsch / englisch
Start: SoSe 2026