

Minimal surfaces exercises

Lecture 1

- Try a little bit to prove the inverse function theorem. If you get stuck, look up a proof and read it.
- Assuming the inverse function theorem for \mathbb{R}^2 , show that it still holds for maps between surfaces. (There is no geometry to this problem, just diagrams of maps.)
- Use the stereographic projection to parametrize S^2 minus the north pole. Calculate its metric g_{ab} in these coordinates. Which is the compatible co-orientation of S^2 ? Without any calculation, determine its shape operator B_b^a in these coordinates. What is the mean and Gauss curvature?
- Suppose S is the graph $(u, v, f(u, v))$ of a function f . Write the mean and Gauss curvature of S in terms of f .

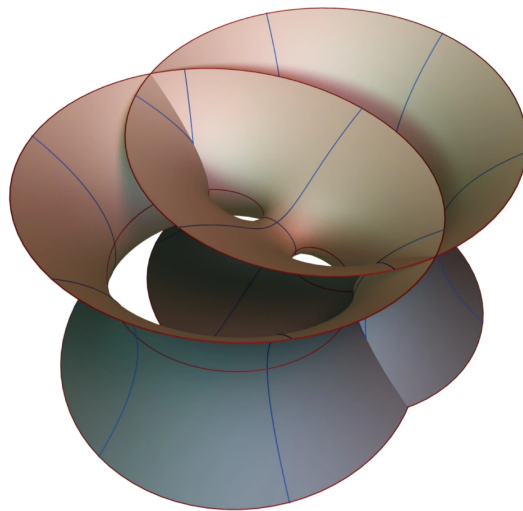


Figure 1: An immersed surface