

Fibered 3-manifolds

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A *closed n -manifold* is a compact Hausdorff topological space in which every point has a neighborhood which is homeomorphic to \mathbb{R}^n . One way of constructing an n manifold M is by taking an $n - 1$ -manifold F , and a homeomorphism $\phi : F \rightarrow F$ and considering the following quotient space

$$M = F \times [0, 1] / (x, 1) \sim (\phi(x), 0).$$

In such a construction M is said to be *fibered (over the circle)*, F is called the *fiber* and ϕ is the *monodromy*. In view of the recent solution of the virtually fibered conjecture, fibered 3-manifolds play a significant role in the study of 3-manifolds.

In this project we will focus on an example of a fibered 3-manifold introduced by W. Thurston and we will try to compute its monodromy, and hopefully understand its “dynamical” properties.

This project will involve a lot of topology, group theory, and some basic combinatorics and linear algebra. We therefore require some knowledge of topology beyond a basic course in point-set topology (e.g familiarity with surfaces and manifolds and/or fundamental groups and covering spaces).