The prime decomposition theorem states that a compact, connected, orientable manifold can be decomposed into a connected sum of prime manifolds [1], and that this is unique up to insertion or deletion of S^3s [2]. The connected sum of two spaces is made by removing a ball from each and identifying their bounding spheres.

The geometrization theorem states that any 3-manifold can be decomposed canonically into submanifolds which each have one of the following eight geometries: $S^3, \mathbb{E}^3, \mathbb{H}^3, S^2 \times \mathbb{R}, \mathbb{H}^2 \times \mathbb{R}, \tilde{SL}(2, \mathbb{R})$, Nil geometry, and Sol geometry.

My program will allow you to smoothly create a connected sum of several geometries. "Smoothness" means that the boundaries that are identified have the same curvatures in each surface. If they are not smoothly identified, then they will appear to have different curvatures from each side. As a result, a geodesic that barely intersects the border can have a very different path than one that barely misses.

I also hope to add cone points to my program.

Corvin Zahn made a computer generated video illustrating a wormhole. He goes into a little detail about what he did, but not how he did it. I have emailed him about it, but he is yet to respond. [4]

References

[1] H. Kneser. Geschlossen flächen in dreidimensionalen mannigfaltigkeiten. *Jahresbericht der Deutschen Mathematiker Vereinigung*, 38:248–260, 1929.

[2] J. Milnor. A unique decomposition theorem for 3-manifolds. *American Journal of Mathematics*, 84(1):1–7, January 1962.

[3] Jeff Weeks. Curved spaces. http://www.geometrygames.org/CurvedSpaces/index.html.

[4] Corvin Zahn. Flight through a wormhole. http://www.spacetimetravel.org/wurmlochflug/wurmlochflug.html, March 2008.