polyTop: Software for computing topology of smooth real surfaces

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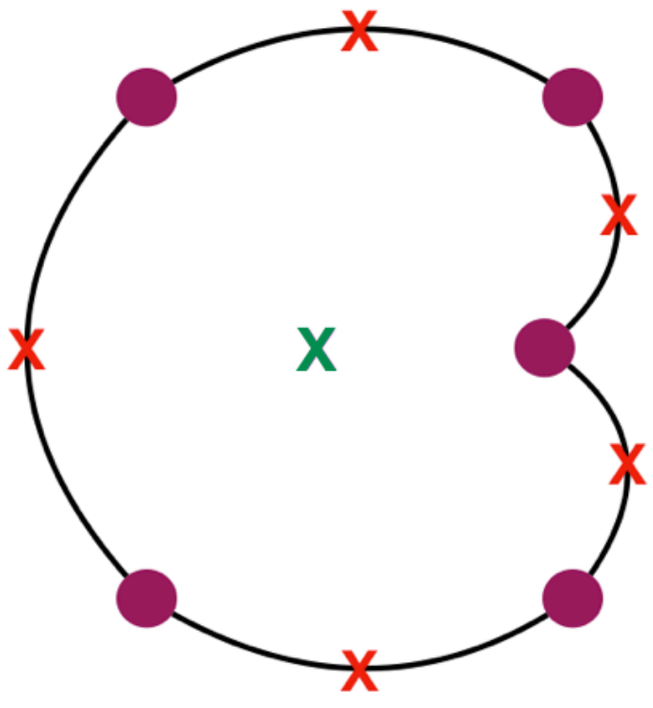
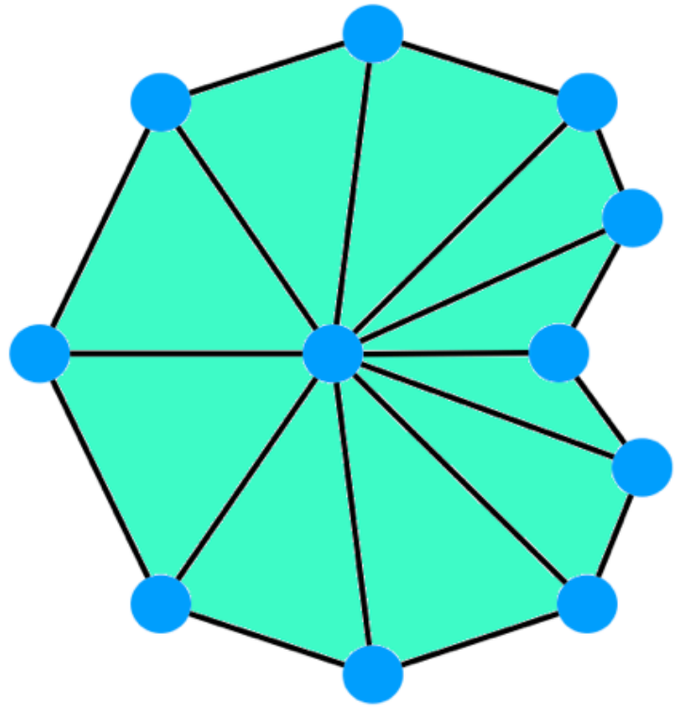
1. define system of polynomial equations
2. run Bertini
3. run Bertini_real
4. gather cell decomposition data in Matlab
5. load javaPlex
6. load Bertini_real data
7. run polyTop*

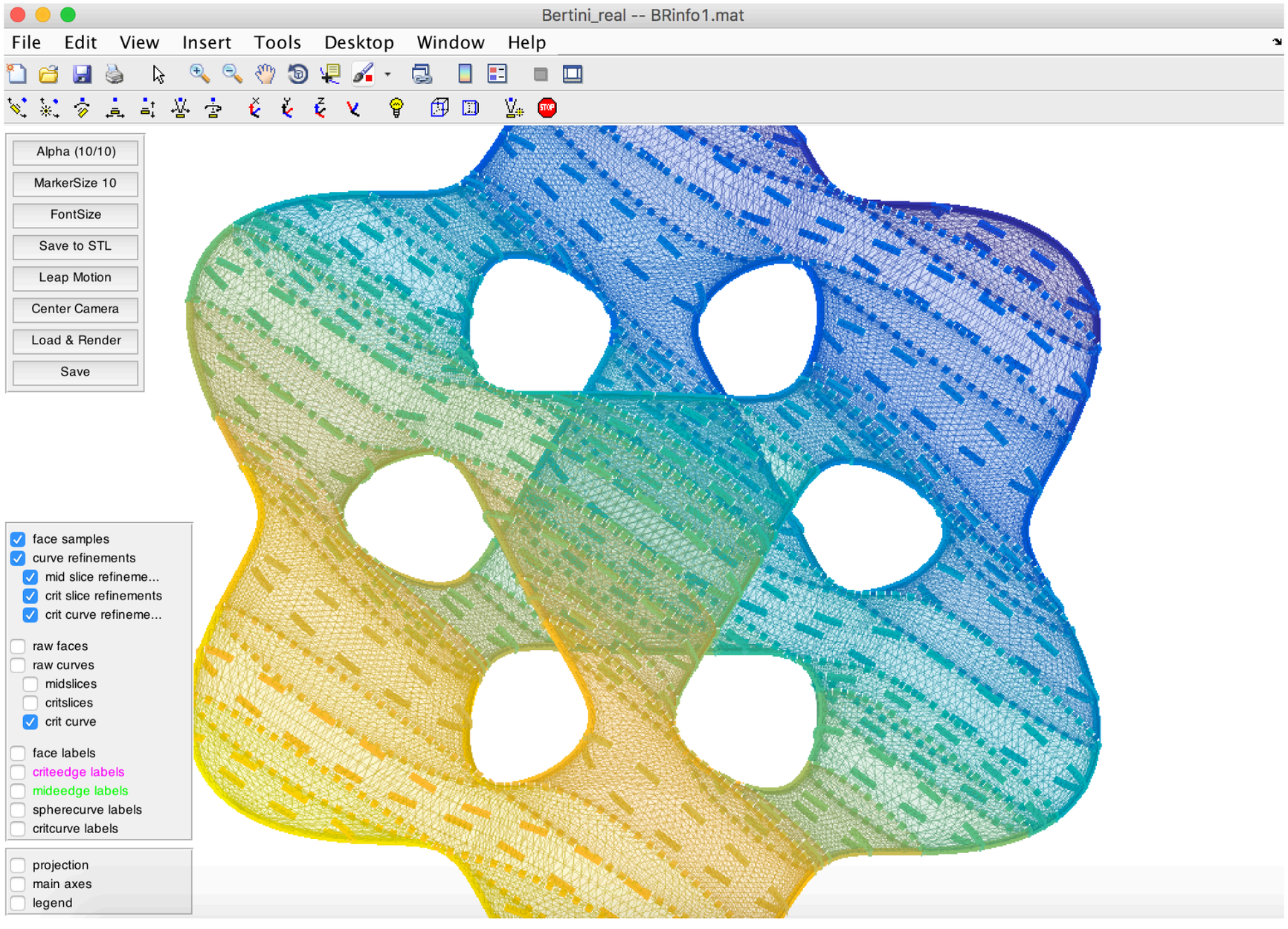




*available at http://dx.doi.org/10.7274/R0PV6HF4

Visualization

1. load Bertini_real data
2. run bertini_real_plotter



Output

- Euler characteristic
- genus
- Betti numbers
- generators of the fundamental group

$$\text{Dimension} : 1$$

$$[0.0, \text{infinity}) : [1, 14] + [2, 9] + [2, 14] + [1, 9] \quad \longleftarrow \text{loop 1}$$

$$[0.0, \text{infinity}) : [3, 18] + [3, 17] + [1, 17] + [1, 18] \quad \longleftarrow \text{loop 2}$$

edge of simplicial complex

vertex of simplicial complex