Homework 2: Cut Graph and Fundamental Domain

Description:

Given a closed surface represented by a triangular mesh, we can cut it open to a simply connected disk, whose boundary consists of identified edges, i.e. edges that should be glued together. Such a connected disk is called the fundamental domain, and the identification on its boundary reveals the surface topology. The cut graph algorithm is a simple way to get the cutting curve.

1) Compute the cut graph (due March 17th)
   Implement the cut graph algorithm (check the slides)
   You can use the half-edge mesh library I provided at:
   http://www.ece.lsu.edu/xinli/teaching/MeshLib2.zip
   or try a simpler but slower version at:
   http://www.ece.lsu.edu/xinli/teaching/MeshLib_Simple.zip
2) Generate the fundamental domain (due March 24th)
   Implement the algorithm for fundamental domain generation (check the slides)

Data and format:

Two test models are provided in this package

a. A genus-1 model: torus.m (you can use vertex 1492 as the base point)
b. Another genus-1 model: star.m (you can use vertex 8591 as the base point)

Your algorithm for 1) takes a mesh, and outputs a file "xx.txt" with a sequence of lines of edges like: "Edge vertexID1 vertexID2"

Your algorithm for 2) takes a mesh, and output a new mesh "yy.m" that is the fundamental domain of the input mesh. And when you open yy.m using "G3dogl.exe" , it tells you that this mesh is genus-0 and has 1 boundary: "g=0, b=1".

DUE: 11:59pm Mar. 24th, 2010