

Spring 2008
CSE598C: Meshing Techniques
Course Announcement

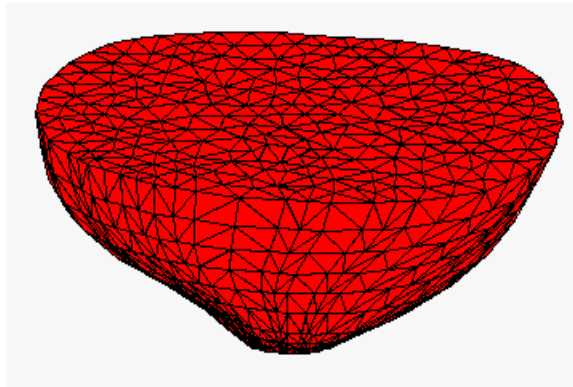
Instructor: Suzanne Shontz

Meeting Time and Place: Tuesdays and Thursdays, 4:15-5:30 PM; 333 IST Building

Schedule number: #123193

Number of credits: 3

Prerequisites: CMPSC (MATH) 451 or CMPSC (MATH) 456 or instructor approval.



Syllabus: Unstructured and structured meshes occur in numerous applications including: cardiology, computer graphics, bridge and building design, geological flows, rocket simulation, climate simulation, and magneto-hydrodynamics. Such meshes are most often used in the solution of partial differential equations (PDEs), although meshes generated for computer graphics are mostly used for rendering or animation. An open question is automatic generation of high-quality meshes for complicated geometries. We will discuss and analyze several existing mesh generation algorithms and will place a special emphasis on Delaunay meshes. Because meshes generated via automatic mesh generation techniques are not always of an acceptable quality, we will also study mesh quality and will discuss several optimization-based mesh quality improvement methods. Finally, we will cover algorithms for other important meshing problems including mesh morphing, adaptive mesh refinement, and mesh compression.

The course may be of interest to students and faculty from

- computer science
- mathematics
- mechanical or civil engineering
- other application fields dealing with meshes (such as geology, physics, meteorology, biology, biomedical engineering, architectural engineering, etc.)

Course Outline:

- Introduction to Mesh Generation
- Generation of Structured and Unstructured Meshes
- 2D Delaunay Mesh Generation
- 3D Delaunay Mesh Generation
- Mesh Quality Improvement Methods
- Mesh Morphing
- Adaptive Mesh Refinement
- Mesh Compression

Evaluation: Students will be evaluated according to the following scheme:

- Homework = 40%
- Project = 60%
 - Material (Code, Theory, Etc.) = 30%
 - Presentation = 15%
 - Report 15%