Geometric Modelling
&
Mesh Representation

Summary

Modeling of Geometric Objects

Man Made Geometry

Classical Modeling (CAD/CAM)

Main Topics

- Conceptual Framework
  - Shapes / Models+Descriptions / Representations
- Representation Schemes
  - Primitive (functional, mesh) / Constructive / Decomposition
- Functional Primitives
  - Object-Based = Dual Function Spec + Generic Interface
- Mesh Primitives
  - Polygonal Data Structure / PL Surface Approximation
- Case Study: Blender
  - Meshes / Surfaces / Metaballs / Curves

Natural Phenomena
Procedural Modeling

Main Topics

- Conceptual Framework
  - Forms / Machines over Reals / Decidable Point Sets / Procedural Rep.
- Functional-Based Models
  - HyperTexture (Noise) / Genetic
- Grammar-Based Models
  - Fractals / Graftals
- Physics-Based Models
  - Particle Systems / Deformable Models / Constraint Systems

Meshes:
Concepts and Theory

Main Topics

- Mesh Representation
  - Concepts (connectivity / regularity / tilings)
  - Classification (faces / structure / topology / combinatorics)
  - Mesh Properties (Size / Uniformity / Regularity / E-Shape / Directionality)
  - What is a Good Mesh (Constrained Approximation / [tolerance,adaptation, smooth])
- Main Mesh Classes
  - Triangle / Quadrilateral / Tri-Quad
- Data Structures for Meshes
  - Tri-List / Index Face Set / Half-Edge / Radial Edge