SPICE – Workshop

TG New Methods: Algorithms, Grid Generation, Code Library

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Two- and three-dimensional unstructured, high quality mesh generation using ICEM and GAMBIT

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What is GAMBIT ?

- GAMBIT is a commercial software package designed by FLUENT
  to mesh models for computational fluid dynamics (CFD) and other scientific applications

   http://www.fluent.com/software/gambit/index.htm

- GAMBIT GUI makes the basic steps of building, meshing, and assigning zone types
  to a model simple and intuitive

- GAMBIT can read a series of input file formats (IGES) generated by CAD applications
  for very complex geometries

What does it cost ?

University prices:	Permanent license:	6300 € initial investment
		1070 € every year
	Annual license:	2100 € every year

=> Permanent license pays off after 5 years!

List of public domain and commercial mesh generators

http://www-users.informatik.rwth-aachen.de/~roberts/meshgeneration.html

Includes:

People and research groups: Info on meshing research at universities, companies
List of people: A directory of people working on mesh generation
Latest news: What's up in mesh generation
Software: A list of software, both public domain and commercial
Conferences: Information on conferences, summerschools, short courses
Literature: Books, reviews, online sources and course materials
Related topics: Pages with information on CFD, scientific computing, computational geometry and other fields related to mesh generation

Procedure of mesh generation with GAMBIT

1) Generation of geometry:

- Geometrical objects consist (in hierarchic order) of
- Vertices
- Edges
- Faces
- Volumes

which can be united, intersected or subtracted

- Geometry can be read from IGES files or vertex data (e.g. topography data from
digital elevation models)

2) Generation of mesh:

- 2-D quadrilateral, triangular or hybrid meshes
- 3-D hexahedral, tetrahedral or hybrid meshes

3) Generation of zones:

- zones are flagged for initialization with different physical parameters

4) Generation of boundaries:

- boundary elements are flagged based on element nodes or sides

3-D Examples

- Tetraheral meshes give the **flexibility** needed for **complex geometries**
- **METIS** mesh partitioner can handle large 3-D tetrahedral meshes easily