

A software module for fully automatic mesh generation

Reference No: B75287

CHALLENGE

The quality of the underlying mesh is crucial for the quality of industrial computations, medical images, and computer modeling. In general, the quality of a generated mesh can be evaluated by the following parameters: minimum angle, the percentage of triangles with an angle below 30 degrees and the total number of mesh elements with a given ratio between maximum and minimum element size. Typical meshes generated with standard methods consist of very small minimum angles and a discontinuous distribution of the element size. This can provoke instabilities and inaccuracies during the computational process. In order to improve the mesh quality with common mesh generation tools the user has to run several iterations of the different mesh generation steps, especially for complex geometrical structures. Moreover, a manual intervention of the user is essential to achieve an acceptable mesh quality.

In summary, established procedures are extremely time-consuming and there is no general approach to create a high quality mesh without the intervention of the user.

INNOVATION

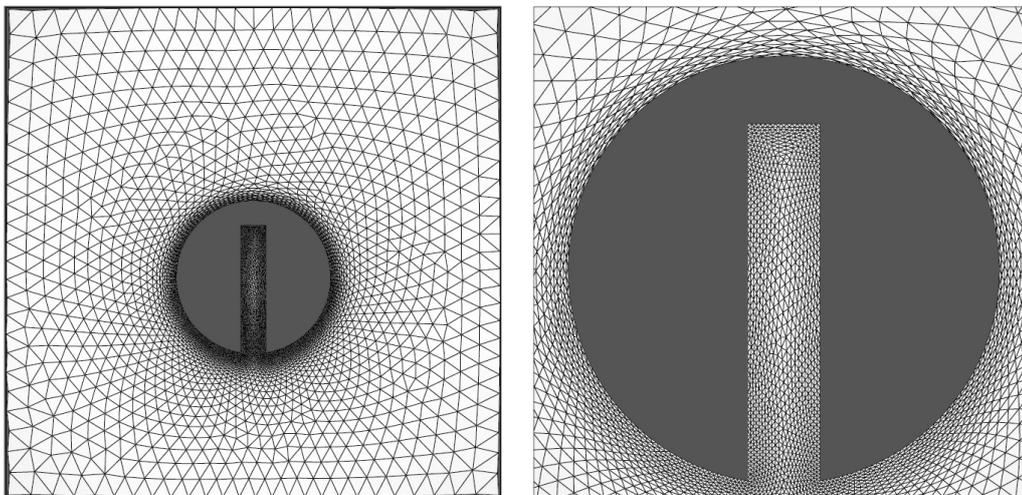
The present invention allows a fully automatic mesh generation. The commonly required manual user intervention as described above can be fully replaced by a sequence of automatic steps resulting in considerable time-savings, especially for models with very complex geometrical features. Moreover, the user can provide a limited number of global parameters to control the isotropy and size-distribution of the final mesh independently of the complexity of the geometrical model. Both the value of the minimum angle and the element-size distribution and thus the quality of the generated meshes can be improved significantly.

COMMERCIAL OPPORTUNITIES

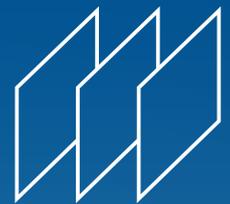
- Software and software modules, especially in the field of mesh-generation.
- Application in software for industrial computations, numerical simulations, computer modeling, computer graphics and the analysis of medical images, etc.

DEVELOPMENT STATUS

Prototype



Automatically generated isotropic triangular mesh from a slotted disk for the outside domain with a stretch ratio of 25 (left), and for the inside domain with a stretch ratio of 4 (right). The average mesh quality $G_{avg} \geq 0.92$ and the average of the minimum angles $\theta_{avg} \geq 53.89^\circ$. The minimum angle $\theta_{min} \geq 36.63^\circ$ suggests that there is no element with a minimum angle $\theta \leq 30^\circ$. 85% of angles are between 50° – 70° .



BayPAT



Technology from
TECHNICAL
UNIVERSITY
OF MUNICH

IP rights:
filed in 2016
EP (pending)
PCT

Contact:
Dr. Bettina Baumeister
+49 (0) 89 5480177-32
bbaumeister@baypat.de

**Bayerische
Patentallianz GmbH**
Prinzregentenstr. 52
80538 München
www.baypat.de