

Lesson 2.1

Tetrahedralisations and 3D Voronoi diagrams

GE01004:
3D modelling of the built environment

<https://3d.bk.tudelft.nl/courses/geo1004>



3D geoinformation

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Triangulating a building (or any 3D model)

13.2.3 b-rep to mesh

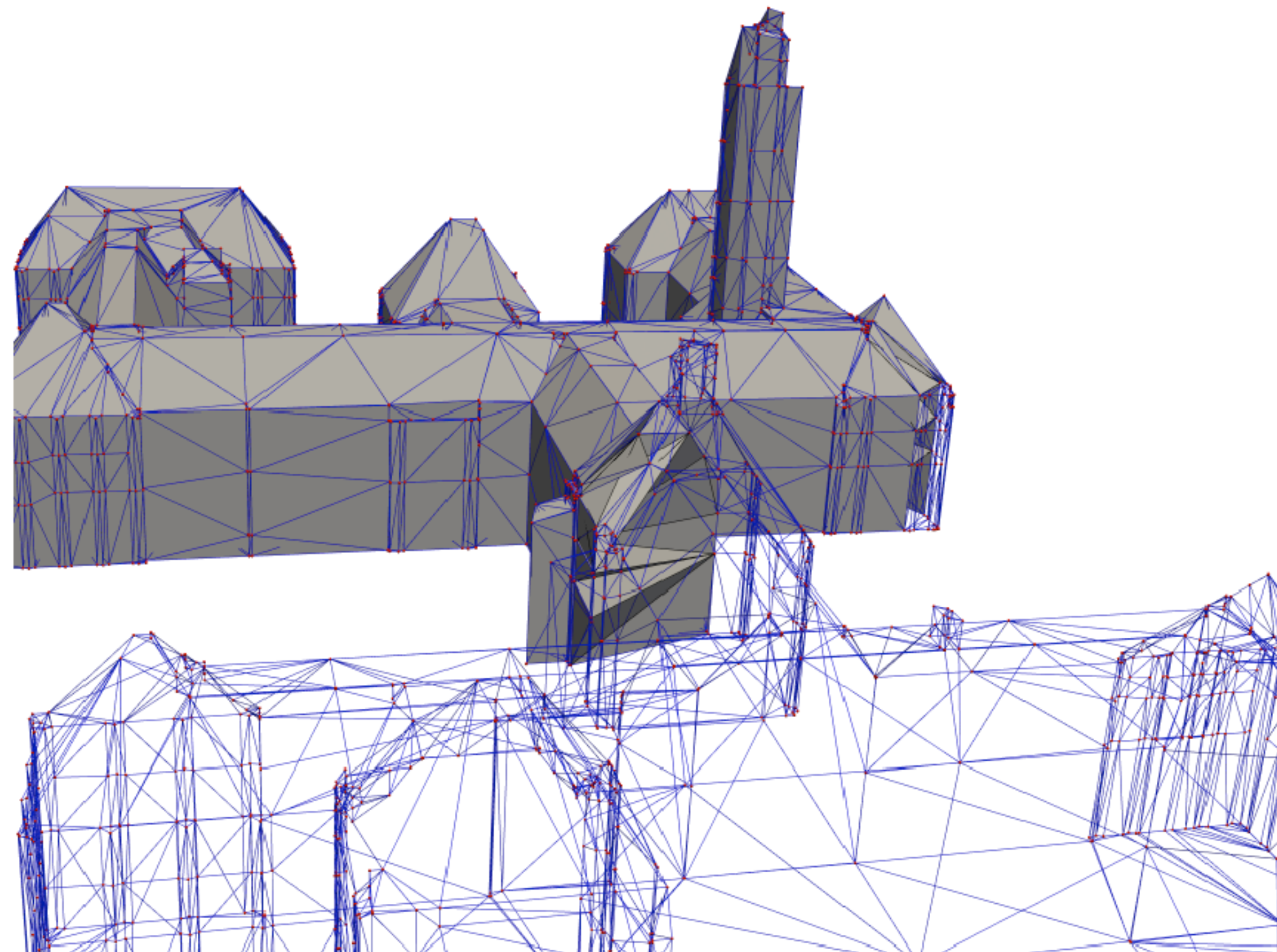
For the purposes of this chapter, a *mesh* is a collection of simplices that define the (3D) shape of an object (eg a building, a tree, or a bridge).

If we take the 3D model of a building (say BK-City, see Figure 13.8), this model is formed of several planar faces (hopefully) forming a closed 2-manifold.

In practice, if someone wants the mesh of this b-rep, it could mean two different structures:

2D triangulation of each surface: the constrained Delaunay triangulation, or simply an arbitrary constrained triangulation, for each of the polygon can be created. These are independently performed for each surface, and involve transforming the 3D coordinate of the vertices of the surface to a 2D system; this coordinate system is on the plane defined by the surface. Notice that this assumes that all input surfaces of the b-rep are planar, if it is not the case then finding a projection that preserves the topology of the polygon might not be possible.

Tetrahedralisation of the volume defined by the surfaces: the constrained tetrahedralisation of the volume defined by the b-rep; see Chapter 3.



demo with one building

- MeshLab: <https://www.meshlab.net>
- TetGen: <http://tetgen.org>
- ParaView: <https://www.paraview.org>