

## Mathematical Colloquia

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**Monday, 11 March 2019**

17:15 h, Lecture Room 119

**Prof. Dr. David Bommes, University of Bern (INF)**

# Quadrilateral and Hexahedral Mesh Generation

### Abstract:

Automatically generating quadrilateral and hexahedral meshes that smoothly align to freeform surfaces and offer a high amount of regularity and low distorted elements is a notoriously challenging task. Novel algorithms based on global optimization rely on the construction of integer-grid maps, which pull back a Cartesian grid of integer isolines from a 2D or 3D domain onto a structure aligned quadrilateral or hexahedral mesh. Such global optimization algorithms do not suffer from limitations known from local advancing front methods, as for instance a high rate of irregularity, and enable meshes comparable to manually designed ones by finding a good compromise between regularity and element distortion. The key for finding good solutions are 3D cross-fields that are employed to globally optimize the orientation and sizing of mesh elements. In my talk, I will give an overview of the state of the art and discuss the strengths and weaknesses of available algorithms, including open challenges for hexahedral meshing.