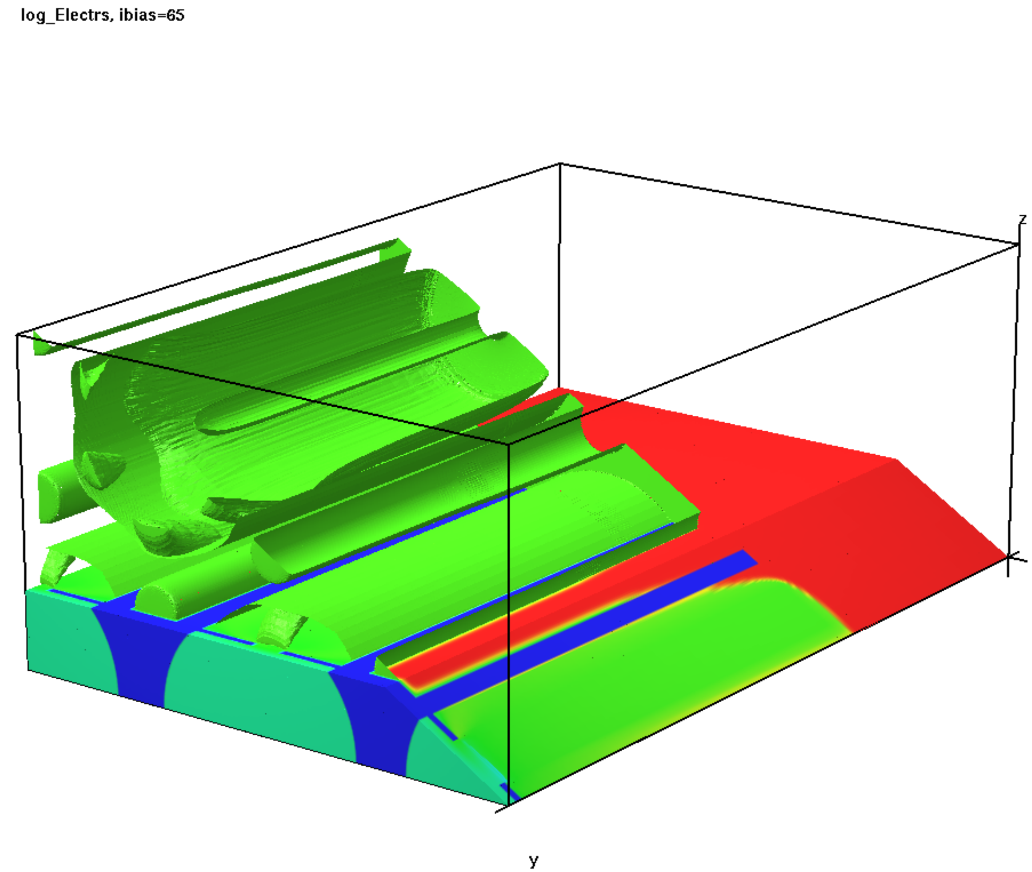
Weierstraß-Institut für Angewandte Analysis und Stochastik

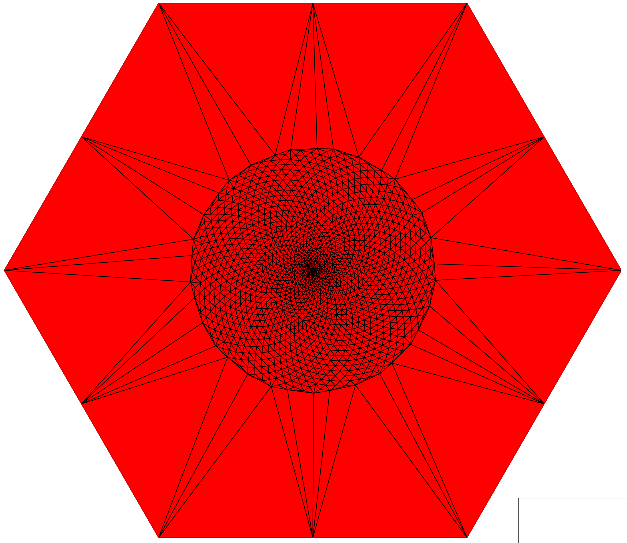
Leibniz Gemeinschaft



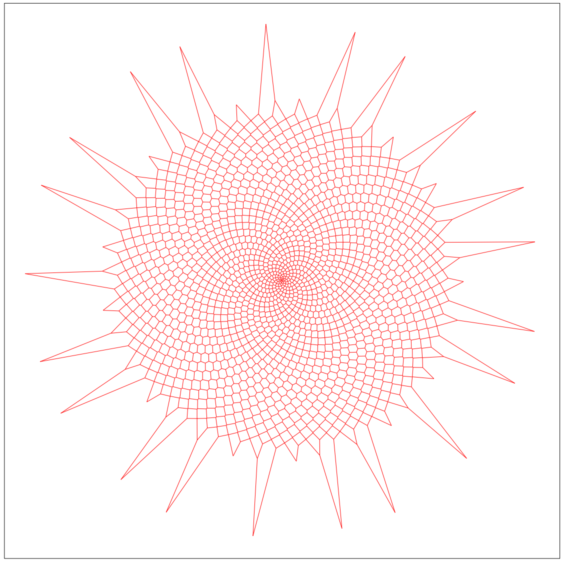
K. Gärtner

What is WIAS? Why Delaunay grids? ...

Outline



- Our interests in boundary conforming Delaunay grids.
- Your interests in Delaunay grids?
- The overlap?



The Delaunay grid and its dual: the Voronoi diagram.

What's WIAS?

The Weierstrass Institute for Applied Analysis and Stochastics (WIAS) engages in project-oriented research in applied mathematics, particularly in applied analysis and applied stochastics, aiming at contributing to the solution of complex economic, scientific, and technological problems.

What's WIAS?

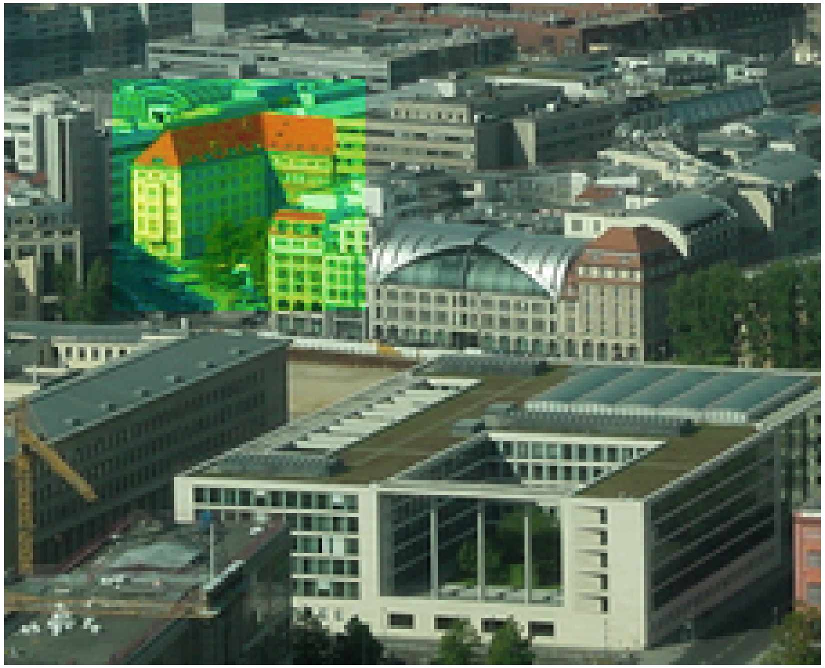
Research Groups:

* Partial Differential Equations, Mielke
* Laser Dynamics, Bandelow
* Numerical Mathematics and Scientific Computing, Fuhrmann
* Nonlinear Optimization and Inverse Problems, Hömberg
* Interacting Random Systems, Bovier
* Stochastic Algorithms and Nonparametric Statistics, Spokoiny
* Thermodynamic Modeling and Analysis of Phase Transitions, Dreyer

What's WIAS?

Main applications:

* nano- and optoelectronics,
* optimization and control of technical processes,
* phase transitions and multifunctional materials,
* stochastics in natural sciences and economics,
* flow and propagation processes in continua,
* numerical methods in analysis and stochastics.



Van Roosbroeck's Equations

$$(1)\qquad -\nabla\cdot\varepsilon\nabla\psi = f - n + p,$$

$$(2)\qquad \frac{\partial n}{\partial t} + \nabla\cdot\mu_n n\nabla\phi_n = R,$$

$$(3)\qquad \frac{\partial p}{\partial t} - \nabla\cdot\mu_p p\nabla\phi_p = R,$$

in $S\times\Omega$, $S=(0,T)$,
$\Omega\subset I\!R^N$, $2\leq N\leq 3$, a bounded Lipschitzian domain,
$\partial\Omega=\Gamma_D\cup\Gamma$, Γ_D closed, positive surface measure,
$R=(np-1)g(n,p)$, $g(n,p)>0$ if $n,p>0$.
Boundary conditions ...
'Theorem': on any boundary conforming Delaunay grid the discrete problem (finite volume scheme) has at least one bounded steady state solution. The analytic and these discrete solutions fulfill identical bounds (depending on f, R, and boundary data).

Summary

Thank you for the attention!