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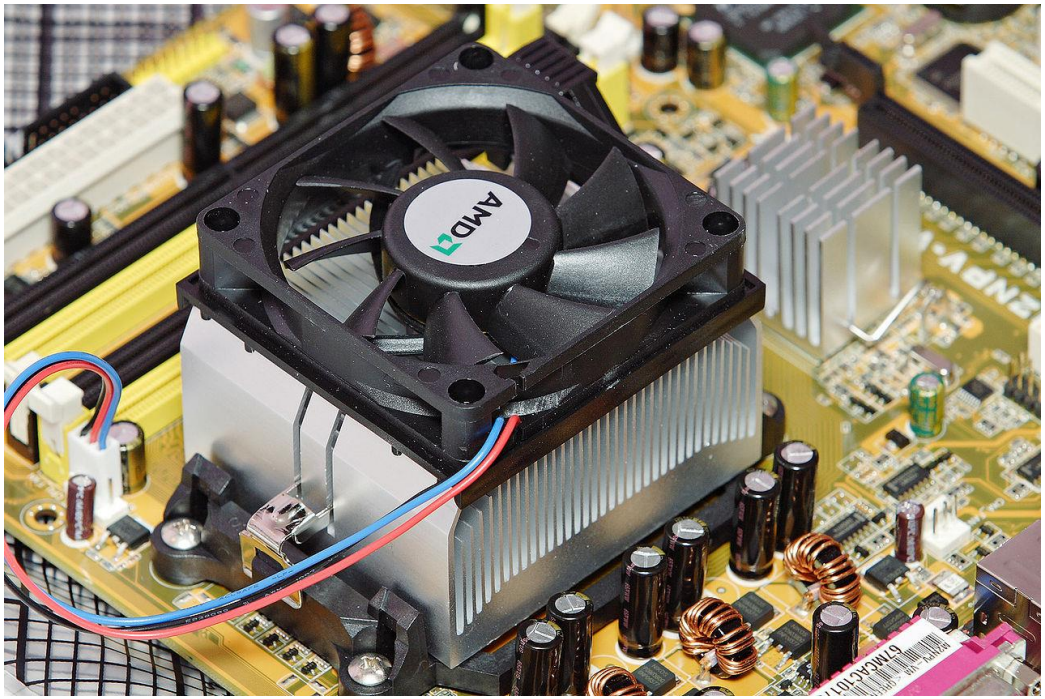
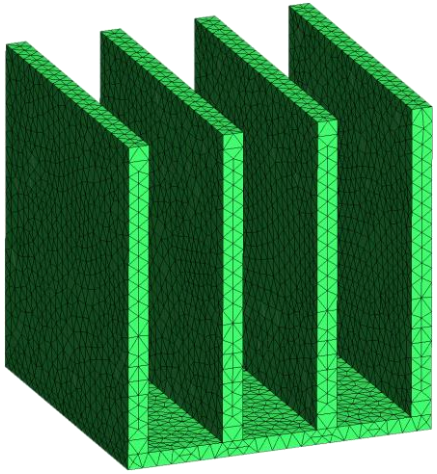
Kunnskap for en bedre verden

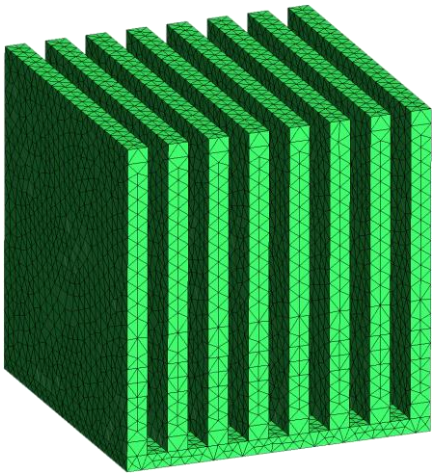
Finite element project

The stationary heat equation



The different geometries





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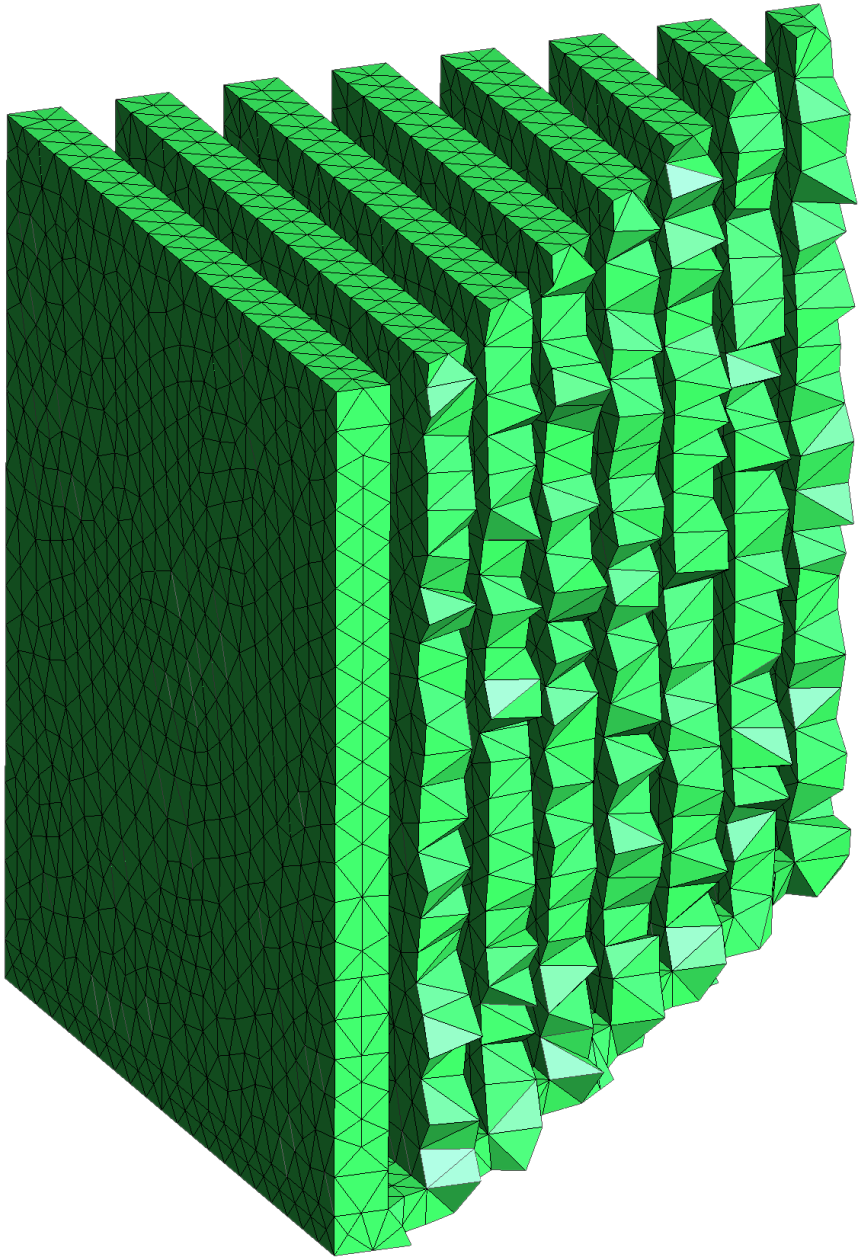

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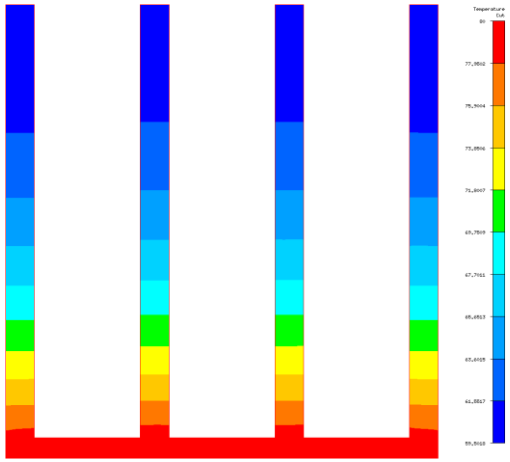
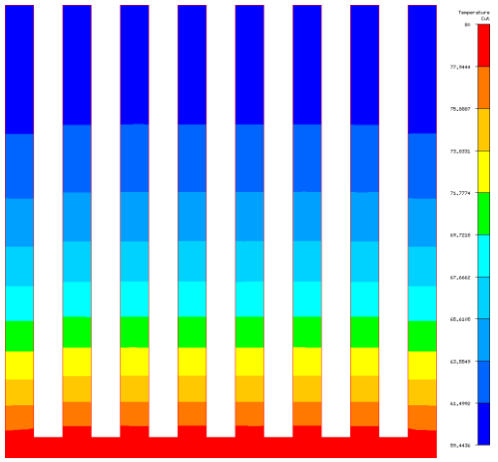
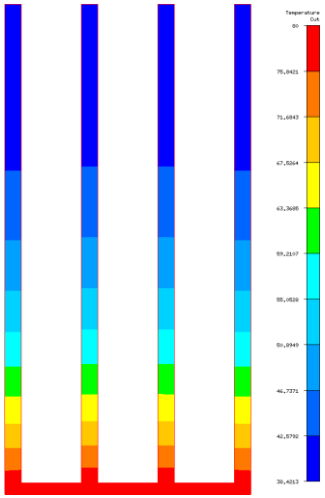
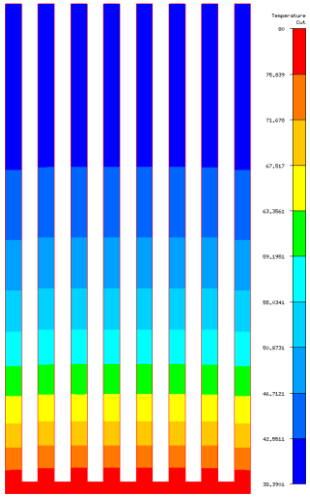
The stationary heat equation

$$
\begin{aligned}
\nabla^2 u(\mathbf{x}) &= 0 && , \quad u(\mathbf{x}) \in \Omega \\
u(\mathbf{x}) &= u_0 && , \quad u(\mathbf{x}) \in \partial\Omega_D \\
k\frac{\partial u(\mathbf{x})}{\partial n} &= -h\left(u(\mathbf{x}) - u_{amb}\right), && \quad u(\mathbf{x}) \in \partial\Omega_R
\end{aligned}
$$

The bilinear form and functional

$$a(u,v) = \frac{k}{h}\int_\Omega \boldsymbol{\nabla} u \cdot \boldsymbol{\nabla} v \,\mathrm{d}\Omega + \int_{\partial\Omega_R} uv \,\mathrm{d}\gamma$$

$$F(v) = u_{amb}\int_{\partial\Omega_R} v \,\mathrm{d}\gamma.$$

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