# Conduction hear transfer between two grain squares

Sources are:

1. <https://bookdown.org/huckley/Physical_Processes_In_Ecosystems/heattransfer.html>
2. <https://www.sciencedirect.com/science/article/pii/S0370157323003770>

We are using a Fourier law of a heat conduction:

Where P – total heat transfer power, S – cross section area of the parallelepiped, ∆T – temperature difference between the faces, l – length of the parallelepiped, – thermal conductivity coefficient

As we are running in a 2D space, and every square has the same width, the length of the touch is always equal to the length of the parallelepiped (square in our case), the formula can be simplified to an equation

And it’s required to adjust the thermal conductivity coefficient for a 2D space to make simulation correct. So, it’s possible to calculate the change in temperature for two grain squares that are touching.

Let us have two squares with temperatures and , so the change in a temperature will be calculated as a

Where – thermal conductivity coefficient, t – time interval such that , in our simulation it will be time interval of engine update, smaller interval – more precise results, and – specific heat capacity for squares, and – mass of the square (depends only on density of the object, from material).

# Engine

## Objects

The only object that is available now in our simulation is GrainSquare, that is a