Project 2: design of a cooling rib

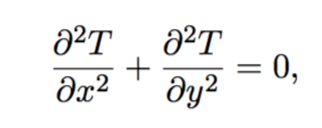
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Steps to solve the problem:

1. Set a initial temperature of the down side of steel T0
2. Solve the temperature of steel part
3. Get the heat flux of steel-water interface
4. Solve the water part

1. Analysis of steel part:

Heat equation:



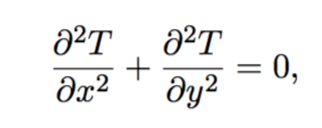
Boundary condition:

, left/right/top side

, bottom edge, set an initial value

Discretization:

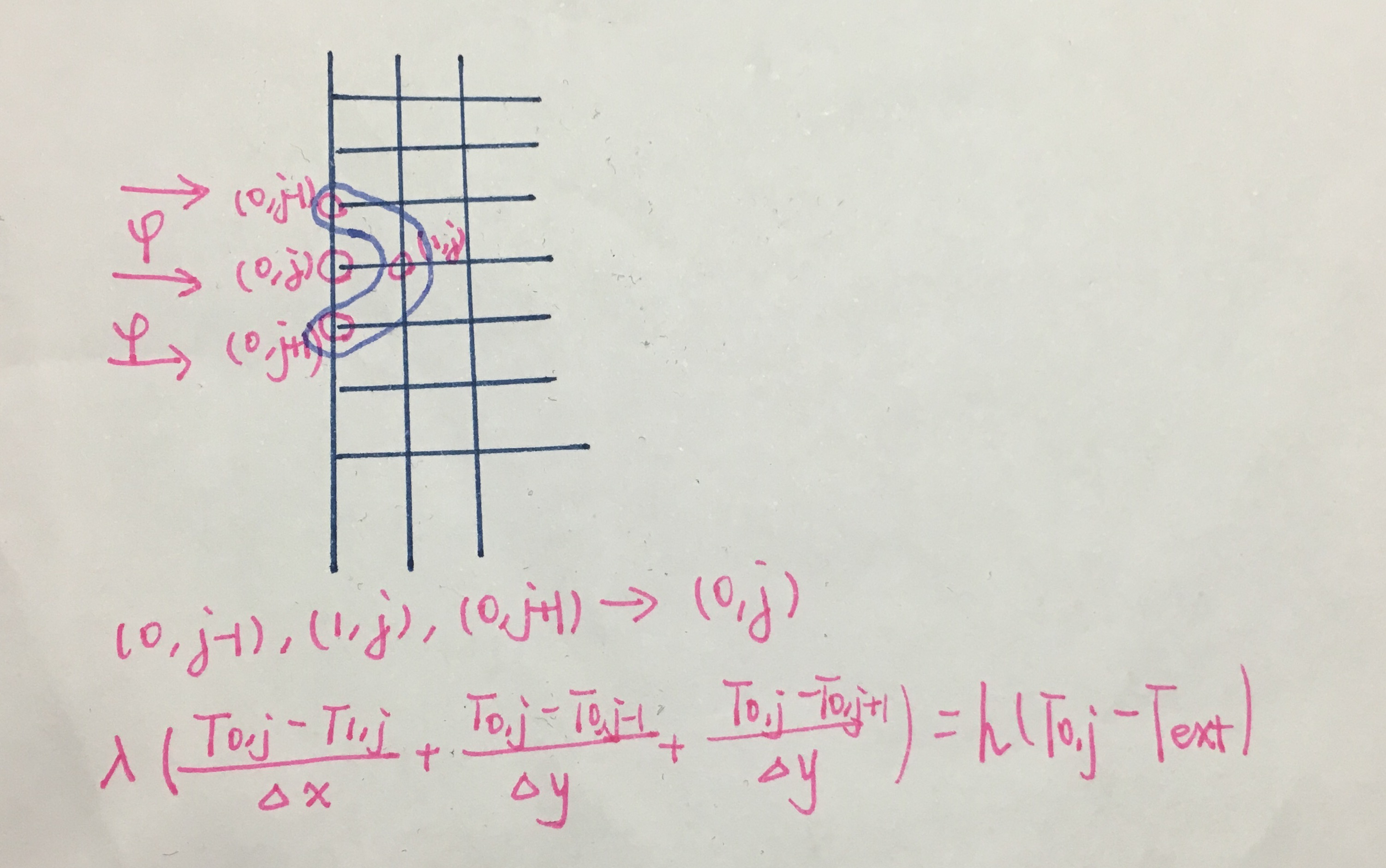
Heat equation:



by Succesive OverRelaxation (SOR) method,

Neumann boundary condition:

left side:



, 0<j<M, M is the number of points

/()

so as the right/top side

bottom side:

2. steel-water interface:

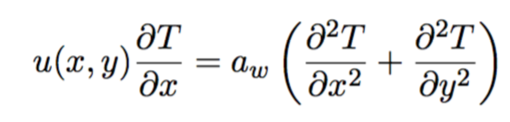
Heat flux of steel-water interface:

= -

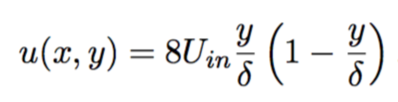
discretization:

3. water part

heat equation:



the velocity is:



boundary condition:

left side: T=300K

top side: -

right side: 0

bottom side: 0

discretization:

set the Uin, upon the velocity equation, we can get:

8Uin(1-)

boundary condition:

|  |  |
| --- | --- |
| Left side |  |
| Right side | = |
| Top side |  |
| Bottom side | = |