**Computational Fluid Dynamics**

**Assignment – 1**

***Submitted by:***

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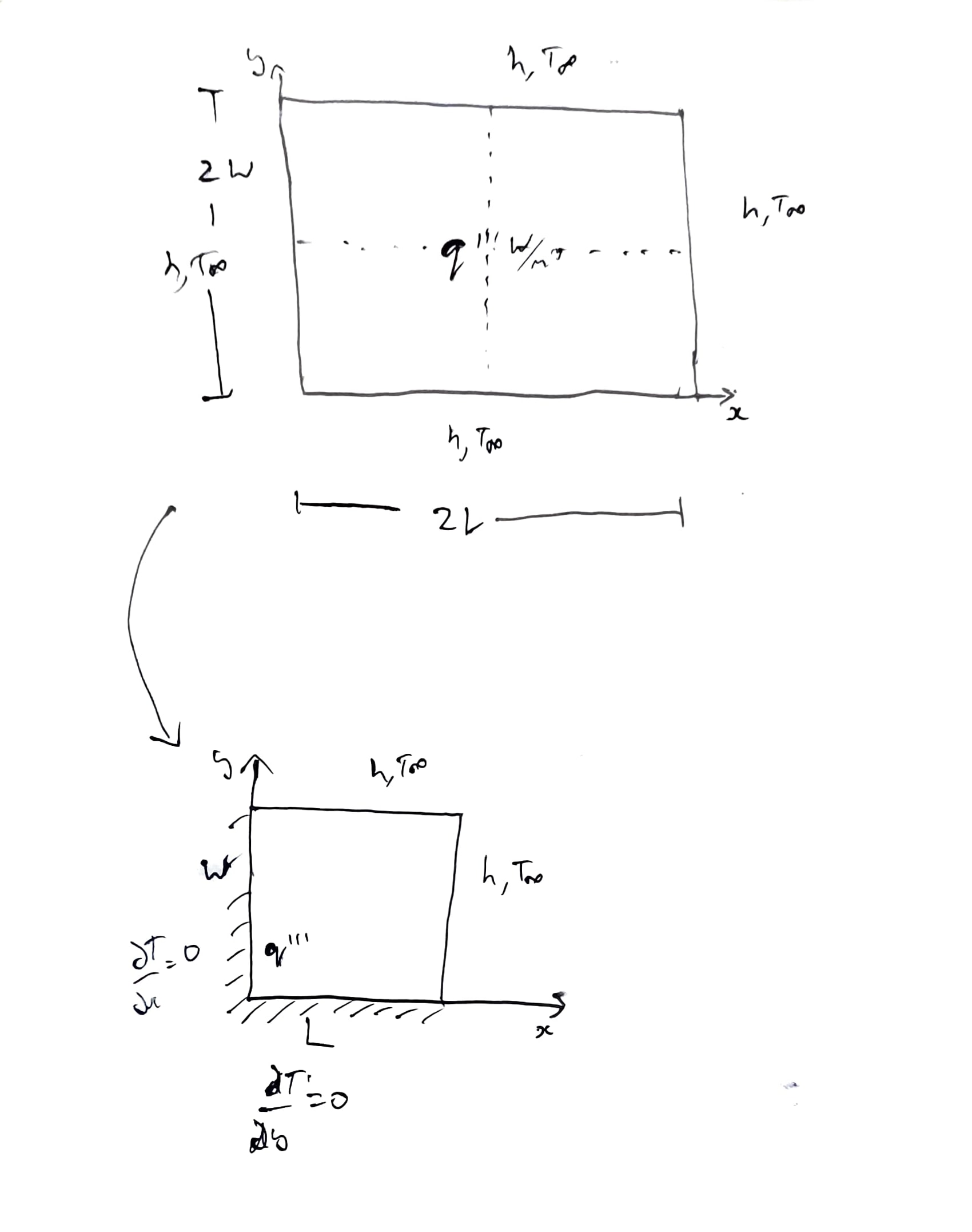
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**Objective:**

Solving the Poisson’s Equation in 2-D for Steady State Conduction subject to Convective Boundary Conditions using FDM and Gauss-Seidel Algorithm with relaxation.

**Problem Statement:**

A rectangular plate (2L x 2W) of material with thermal conductivity ‘k’ with uniform heat generation of q’’’ is exposed to a convective medium at T= T∞ and convective heat transfer coefficient ‘h’. The heat transfer is taking place at steady state in both the x and y directions. Due to symmetry, the domain can be divided into 4 equal sections and the solution can be calculated for only one section as the temperature field will be symmetric for all the sections.



**Formulation**

The Governing Differential Equation is:

Non-Dimensional form:

Where,

Boundary Conditions,

Left Edge,

Bottom Edge,

Right Edge,

Top Edge,

**Discretization**

Dividing the domain into m and n nodes respectively along L and W and using 2nd Order Central Difference method for the differential equation, we get the following expression for ,

At the right edge,

At the top edge,

At the left edge,

At the bottom edge,

At the top right corner,

At the top left corner,

At the bottom right corner,

At the bottom left corner,