Numerical Solutions of Differential Equations : HW1

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Introduction

This is the introduction bitches!

1 Conservation laws

blabla

2 Heat Equation

2.1 Flux vector

2.2 Q(t)

We are now interested in computing :

$$Q(t) = \int_0 \int_0 q(x, y, t)dxdy$$

Using the fundamental theorem of calculus, we have :

$$Q(t) = Q(0) + \int_0 Q'(\tau)d\tau$$

The initial condition gives :

$$Q(0) = \int_0 \int_0 q(x, y, 0)dxdy = \int_0 \int_0 0\, dxdy = 0$$

We also know that (using the definition of Q) :

$$Q'(t) = \int_0 \int_0 q_t(x, y, t)dxdy$$

We are now going to use the PDE to substitute q_t. This yields :

$$Q'(t) = \int_0 \int_0 q_t(x, y, t)dxdy = \int_0 \int_0 \nabla \cdot (\nabla q(x, y, t))dxdy + \int_0 \int_0 S(x, y, t)dxdy$$

3 Discretization and implementation

blabla

4 Numerical results

blabla bitches

5 Refinements

blabla