Crank-Nicolson Method for 1D Diffusion-Advection Equation

**Solving the Equation:**

C = C(x,t), u = dL/dt, and d is a parameter.

**Crank-Nicolson:**

**Substitute** these terms into the diffusion-advection equation:

**Isolate** the terms depending on the new time (n+1) on the right-hand-side:

Letting , , and **grouping** like terms:

**Formation as Matrix Equation**

,

where N is the number of grid points.

**Solution**

Call the left-hand matrix A and the right hand matrix B.

To find C at all grid points at a given time, we iterate:

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