

Ajani Mnyandu – Exercise 12

1. As the dissolved inorganic nitrogen is advected toward the right, the concentration of DIN increases at the edges because the DIN is moving from an area of high concentration (at the centre) to an area of low concentration (at the edges) under the influence of the concentration gradient between the centre and the edges. This gradient flattens and becomes smaller with time.
2. The Neumann boundary conditions are more realistic in this context because they represent scenarios where the concentration gradient at the boundary is influenced by adjacent interior points, rather than prescribing a fixed concentration value.
3. Doubling the diffusivity coefficient would lead to faster spreading of the concentration profile due to increased diffusion. This would result in a broader and more diffused peak. To address this and maintain stability, the spatial resolution must decrease (increase Δx) or decrease the temporal resolution (decrease Δt) to ensure that the Courant number remains within a stable range.