Q17.1 Difference between conserved and non-conserved dynamics in Ising models

Non-conserved dynamics allow spins to flip independently, changing the total magnetization. Conserved dynamics keep total magnetization constant, with spins exchanging positions instead of flipping.

Q17.2 Difference between conserved and non-conserved dynamics in surface relaxation

Non conserved dynamics occur when atoms are exchanged with a vapor, changing total surface mass. Conserved dynamics occur when atoms move along the surface without leaving it, keeping total mass constant.

Q17.3 Outline of a computer code to solve the time-dependent surface relaxation

1. Set parameters $a_1, a_2, \delta x, \delta t, T$, and grid points.
2. Initialize $h(x, 0)$ as the starting surface profile.
3. Use finite differences to calculate second and fourth derivatives.
4. Update using:
$$h_i^{n+1} = h_i^n + \delta t(a_1 h_{xx} - a_2 h_{xxxx})$$
5. Apply boundary conditions and loop until final time.

Q17.4 Neumann stability condition

For stability:
$$\delta t < \frac{\delta x^2}{2a_1}.$$
Which ill ensure the finite difference solution does not diverge.