



$$\begin{aligned}
 \Psi_N^{n+1} &= 2(1 - \lambda^2) \Psi_N^n - \Psi_N^{n-1} + \frac{\lambda^2 S_{N+1/2}}{\bar{S}_N} \Psi_{N+1}^n + \frac{\lambda^2 S_{N-1/2}}{\bar{S}_N} \Psi_{N-1}^n \\
 \Psi_N^{n+1} &= 2(1 - \lambda^2) \Psi_N^n - \Psi_N^{n-1} \\
 &\quad + \frac{\lambda^2 S_{N+1/2}}{\bar{S}_N} \left[h \left(-\frac{a_1}{2k} (\Psi_N^{n+1} - \Psi_N^{n-1}) - \frac{a_2}{2} (\Psi_N^{n+1} + \Psi_N^{n-1}) \right) + \Psi_N^n \right] \\
 &\quad + \frac{\lambda^2 S_{N-1/2}}{\bar{S}_N} \Psi_{N-1}^n \\
 \Psi_N^{n+1} &= 2(1 - \lambda^2) \Psi_N^n - \Psi_N^{n-1} + \frac{\lambda^2 S_{N+1/2}}{\bar{S}_N} \left[\left(-\frac{a_1}{2k} - \frac{a_2}{2} \right) \Psi_N^{n+1} + \left(\frac{a_1}{k} + \frac{a_2}{2} \right) \Psi_N^{n-1} \right] \\
 &\quad + \frac{\lambda^2 S_{N+1/2}}{\bar{S}_N} \Psi_N^n + \frac{\lambda^2 S_{N-1/2}}{\bar{S}_N} \Psi_{N-1}^n \\
 \Psi_N^{n+1} &= 2(1 - \lambda^2) \Psi_N^n - \Psi_N^{n-1} + \frac{h \lambda^2 S_{N+1/2}}{\bar{S}_N} \left(\frac{a_1}{2k} - \frac{a_2}{2} \right) \Psi_N^{n-1} \\
 &\quad + \frac{\lambda^2 S_{N+1/2}}{\bar{S}_N} \Psi_N^n + \frac{\lambda^2 S_{N-1/2}}{\bar{S}_N} \Psi_{N-1}^n \\
 \Psi_N^{n+1} &= \frac{2(1 - \lambda^2) \Psi_N^n - \Psi_N^{n-1} + \frac{h \lambda^2 S_{N+1/2}}{\bar{S}_N} \left(\frac{a_1}{2k} - \frac{a_2}{2} \right) \Psi_N^{n-1} + \frac{\lambda^2 S_{N+1/2}}{\bar{S}_N} \Psi_N^n + \frac{\lambda^2 S_{N-1/2}}{\bar{S}_N} \Psi_{N-1}^n}{\left(1 + \left(\frac{a_1}{2k} + \frac{a_2}{2} \right) \frac{h \lambda^2 S_{N+1/2}}{\bar{S}_N} \right)}
 \end{aligned}$$