$$
\left.\begin{array}{l}
n_t + \boldsymbol{u} \cdot \nabla n + \chi \nabla \cdot [n r(c) \nabla c] = D_n \Delta n, \\
c_t + \boldsymbol{u} \cdot \nabla c = D_c \Delta c - n \kappa r(c), \\
\rho(\boldsymbol{u}_t + \boldsymbol{u} \cdot \nabla \boldsymbol{u}) + \nabla p = \eta \Delta \boldsymbol{u} - n \nabla \Phi, \\
\nabla \cdot \boldsymbol{u} = 0,
\end{array}\right\}
$$

Physical geometry: 2D rectangle

Boundary conditions:

Periodic boundary conditions at the left and right walls

Top wall:

$$\chi n r(c) c_y - D_n n_y = 0, \quad c = c_{air}, \quad v = 0, \quad u_y = 0,$$

bottom wall:

$$n_y = c_y = 0, \quad u = v = 0,$$