Fig. 7. Illustration of the Auxin transport and PIN1 cycling models. (A) AH (weak acid form) transport. (B) A\(^-\) (anion form) transport. Note that also the A\(^-\) influx is dependent on \(P_{ij}\). This rate is low compared with the efflux, and this mechanism is not illustrated. (C) PIN1 cycling model.

Fig. 8. (A) pH dependence of the fraction of the different auxin variants. The lines show the dependence and the points show the values used in the simulations. (B) Membrane voltage dependence of the factors in the PIN1 mediated transport. The absolute value of the membrane potential is used on the \(x\) axis in the plot.

Fig. 9. Auxin equilibrium concentrations for simulations on the template with extracted PIN1 concentrations. \(K_A\) in the MM-description of active auxin concentration is varied from \(K_A = 1\), to boundaries estimated in Mitchison (1). (A) \(K_A = 0.3\). (B) \(K_A = 2.0\).


Fig. 10. Auxin equilibrium concentrations for simulations on the template with extracted PIN1 concentrations. The \(p_{A^-}\) in the active auxin transport terms are varied twofold from the value \(p_{A^-} = 12.4\) estimated by Goldsmith et al. (1). (A) \(0.5p_{A^-}\). (B) \(2.0p_{A^-}\).


Fig. 11. Auxin equilibrium concentrations for simulations on the template with extracted PIN1 concentrations. The auxin levels (production) is varied twofold from the value \(c_A = 0.1\). (A) \(0.5c_A\). (B) \(2.0c_A\).

Fig. 12. (A) Eigenvalue distribution for similar values of \(D/TP\) as used in the simulations presented in Fig. 3. The homogeneous state is unstable if the maximal eigenvalue is larger than zero. (B) Distance between peaks at initial dynamics around the unstable homogeneous fixed point as a function of \(D/TP\).

Fig. 13. Optimization for the PIN1 cycling model using a nonlinear auxin dependence for the cellular to membrane term. The parameters that are optimized and shown in the plots are the relative internalization/membranalization strengths, \(K_P = k_2/k_1\), and the Hill coefficient and constant, \(n, K\). (A) Mean squared error, \(E_{\text{tot}}\) for different parameter values. (B) Solutions found by restarting the local optimizer 100 times with different initial parameter values. The optimum parameter set chosen for further investigations is also marked in the plot (\(n = 3.0, K = 0.4, \text{ and } K_P = 0.4\)).