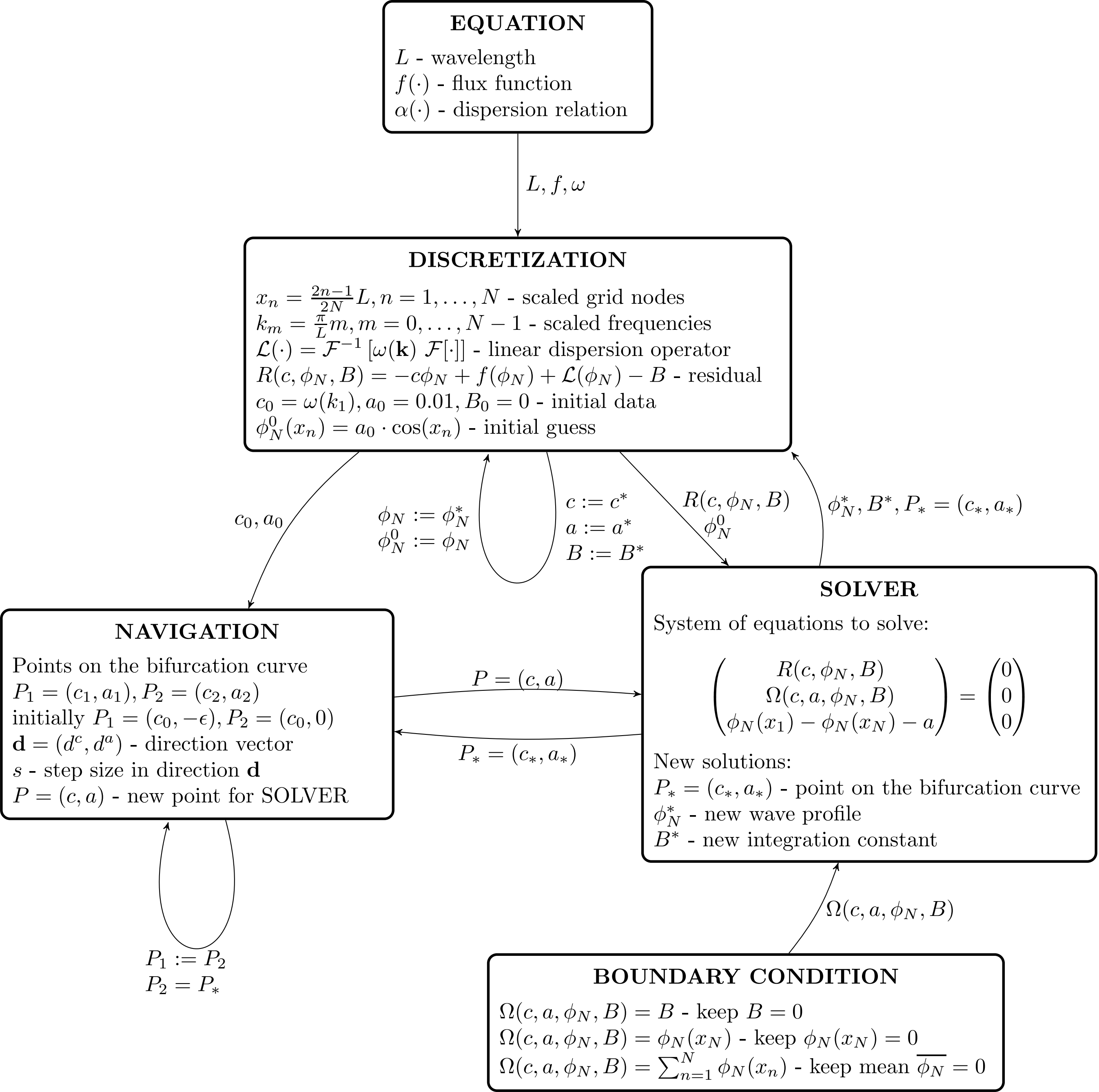
EQUATION
L - wavelength
$f(\cdot)$ - flux function
$\alpha(\cdot)$ - dispersion relation
L, f, ω
DISCRETIZATION
$x_n = \frac{2n-1}{2N} L, n = 1, \ldots, N$ - scaled grid nodes
$k_m = \frac{\pi}{L} m, m = 0, \ldots, N-1$ - scaled frequencies
$\mathcal{L}(\cdot) = \mathcal{F}^{-1}\left[\omega(\mathbf{k})\ \mathcal{F}[\cdot]\right]$ - linear dispersion operator
$R(c, \phi_N, B) = -c\phi_N + f(\phi_N) + \mathcal{L}(\phi_N) - B$ - residual
$c_0 = \omega(k_1), a_0 = 0.01, B_0 = 0$ - initial data
$\phi_N^0(x_n) = a_0 \cdot \cos(x_n)$ - initial guess
c_0, a_0
$\phi_N := \phi_N^*$
$\phi_N^0 := \phi_N$
$c := c^*$
$a := a^*$
$B := B^*$
$R(c, \phi_N, B)$
ϕ_N^0
$\phi_N^*, B^*, P_* = (c_*, a_*)$
NAVIGATION
Points on the bifurcation curve
$P_1 = (c_1, a_1), P_2 = (c_2, a_2)$
initially $P_1 = (c_0, -\epsilon), P_2 = (c_0, 0)$
$\mathbf{d} = (d^c, d^a)$ - direction vector
s - step size in direction $\mathbf{d}$
$P = (c, a)$ - new point for SOLVER
$P = (c, a)$
$P_* = (c_*, a_*)$
$P_1 := P_2$
$P_2 = P_*$
SOLVER
System of equations to solve:
$\begin{pmatrix} R(c, \phi_N, B) \\ \Omega(c, a, \phi_N, B) \\ \phi_N(x_1) - \phi_N(x_N) - a \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$
New solutions:
$P_* = (c_*, a_*)$ - point on the bifurcation curve
ϕ_N^* - new wave profile
B^* - new integration constant
$\Omega(c, a, \phi_N, B)$
BOUNDARY CONDITION
$\Omega(c, a, \phi_N, B) = B$ - keep $B = 0$
$\Omega(c, a, \phi_N, B) = \phi_N(x_N)$ - keep $\phi_N(x_N) = 0$
$\Omega(c, a, \phi_N, B) = \sum_{n=1}^{N} \phi_N(x_n)$ - keep mean $\overline{\phi_N} = 0$