Parameters related to SSW analysis

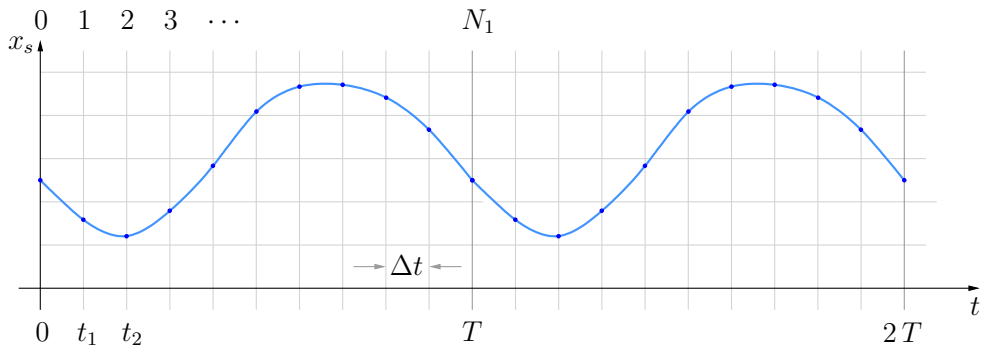

Figure 1: Illustration of parameters related to SSW analysis. A schematic plot of $x_s(t)$ is shown where x_s is a state variable.

SSW analysis is meant for computing the periodic steady-state solution (see Chapter 7 of Part-1). There are two sets of parameters related to SSW analysis: (a) waveform parameters, (b) NR parameters.

Waveform parameters:

* `ssw_period`: (real number) waveform period (T in the figure).
* `ssw_frequency`: (real number) waveform frequency ($1/T$).

  Either `ssw_period` or `ssw_frequency` must be specified.
* `ssw_ndiv`: (integer) number of divisions in one period (N_1 in the figure, default: 100). If `delt_const` (Δt in the figure) is specified, `ssw_ndiv` is ignored.
* `ssw_period_mult`: (integer) number of SSW periods to be simulated (default: 1). Only one period is really required to be simulated. However, the user may want to view a graph showing a few periods, and therefore this option is made available.

NR parameters: As shown in Fig. 7.3 in Part-1, the SSW state variable computation involves a Newton-Raphson (NR) loop (the *outer* NR loop in the figure). Parameters related to this loop are specific to SSW analysis and are described below[1].

* `ssw_itmax_newton`: (integer) maximum number of outer NR iterations allowed (default: 20).
* `ssw_dmp`: (`yes`/`no`) decides whether damping (see Eq. 3.19 in Part-1) should be used for the outer NR loop (default: `no`)
* `ssw_dmp_k`: (real number) damping factor k ($0 < k < 1$) for the outer NR loop (see Eq. 3.19 in Part-1, default: 0.8). Not relevant when `ssw_dmp` is set to `no`.

[1]If the circuit is nonlinear, there is *another* NR loop – the *inner* NR loop. Parameters for that loop (e.g., `itmax_newton`, `dmp`, etc.) are identical to those described elsewhere and are not repeated here.

* `ssw_dmp_newt_max`: (integer) number of NR iterations for which damping is to be applied in the outer NR loop (default: 10). Not relevant when `ssw_dmp` is set to `no`.

* `ssw_chk_rhs2`: (`yes`/`no`) specifies whether the 2-norm should be used to check for convergence of the outer NR iterations (default: `no` if there are electrical elements in the system being simulated; else, `yes`).

* `ssw_norm`: (real number) specifies the tolerance to check convergence of the outer NR iterations. It applies if `ssw_chk_rhs2` is `yes`, and in that case, the 2-norm, $\left[\frac{1}{N'}\sum_{i=1}^{N'} f_i\right]^{1/2}$, is compared with `ssw_norm` to test for convergence, where N' is the number of state variables.

* `ssw_chk_spice`: (`yes`/`no`) specifies whether the SPICE convergence criteria should be used to check for convergence of the outer NR iterations (default: `yes` if there are electrical elements in the system being simulated; else, `no`).