clock_3.xbe

Attributes

```
xbe name=clock_3 evaluate=yes limit_tstep=yes
Jacobian: constant
input_vars:
output_vars: y
aux_vars:
iparms: indx=1
sparms:
rparms:
+  alpha=10
+  beta=0
+  T=0.02
+  y_high=1
+  delta1=0.01
+  delta2=0.01
+  T1=0
+  T2=0
+  t0=0
+  L1=0
+  L2=0
+  L0=0
+  tk1=0
+  tk2=0
+  tk3=0
+  tk4=0
+  tk5=0
+  slope1=0
+  slope2=0
+  epsl=0
stparms:
igparms:
outparms: y
```

Description

`clock_3.xbe` is useful in generating gate signals for applications such as the neutral point clamped inverter. It is a square wave source with `y` as its output. Its behaviour is controlled by integer parameter `indx` and real parameters `alpha`, `beta`, `T`, `y_high`, `delta1`, `delta2`. Each period (given by the parameter `T`) of $y(t)$ has two intervals, `T1` and `T2`. The value of `y` in these two intervals depends on `indx` as follows.

(a) `indx` = 1 or 3: In the first interval (`T1`), $y = y_{\text{high}}$, and in the second interval (`T2`), $y = 0$.

(b) `indx` = 2 or 4: In the first interval (`T1`), $y = 0$, and in the second interval (`T2`), $y = y_{\text{high}}$.

The intervals `T1` and `T2` are computed in terms of the real parameter `alpha` as follows.

$$T_1 = \frac{180 - 2\,\alpha}{360}\,T, \tag{1}$$

$$T_2 = T - T_1. \tag{2}$$

The offset (i.e., the beginning of the `T1` phase) is denoted by t_0, and is computed as follows.

(a) `indx` = 1 or 2:

$$t_0 = \frac{\alpha}{360}\,T + \frac{\beta}{360}\,T, \tag{3}$$

(b) `indx` = 3 or 4:

$$t_0 = \frac{\alpha}{360} T + \frac{\beta}{360} T + \frac{T}{2}. \tag{4}$$

The parameters `delta1` and `delta2` have the following meaning.

`delta1`: Width of the transition from the `T2` phase to the `T1` phase.

`delta2`: Width of the transition from the `T1` phase to the `T2` phase.

`y` is made available as an output variable. $y(t)$ is shown in the following figure for different values of `indx`.

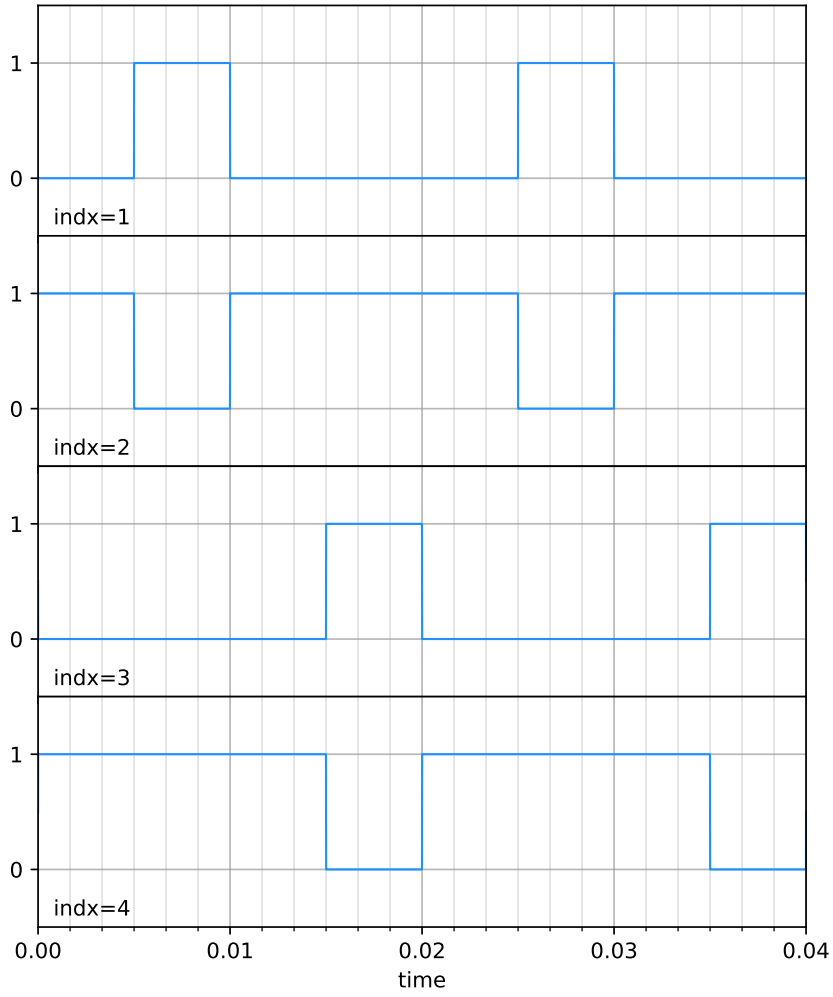

Figure 1: $y(t)$ obtained with `y_high` = 1, `T` = `20m`, `alpha` = 45, `beta` = 45, `delta1` = `0.01m`, `delta2` = `0.01m`, and different values of `indx`.