

switch_pair_1.gce

Attributes

```
mainvars: x1 x2 y1 y2
auxvars: xout1 xout2 vc1 vc2 v0 x1a x2a
rparms: t_delay=1 g_high=1
+      eps1=1.0e-6 delt_min=1.0e-6 delt_nrml=1.0e-3
```

Description

`switch_pair_1.gce` is designed to generate signals required to drive a pair of switches in a “non-overlapping” manner. It compares general variables `x1` and `x2` and produces outputs `y1` and `y2`. The value of `y1` is `g_high` if `x1 > x2`; else, it is zero. For `y2`, the opposite is true; viz., `y2` is equal to `g_high` if `x1 < x2`; else, it is zero. However, a delay is introduced between the transitions in `y1` and `y2` as depicted in Fig. 1.

It should be noted that `switch_pair_1.gce` only produces the signals to drive a pair of switches. The switches themselves are *external* to `switch_pair_1.gce`.

The parameters `delt_min`, `delt_nrml`, and `eps1` are used for controlling the simulator time steps. Additional time points are forced, depending on the values of `delt_min` and `delt_nrml`, when `x1` and `x2` are within `eps1` of each other. This feature allows accurate simulation without having to make the average time step very small. Generally, `delt_nrml` should be made equal to the typical simulator time step (`delt_const`) while `delt_min` should be made much smaller (say, by a factor of 100).

AC behaviour is not implemented.

Fig. 1 shows typical waveforms obtained using `switch_pair_1.gce`. The corresponding circuit file is given below. The input signal `x1` is a triangular wave while `x2` is a constant (equal to zero).

```

title: testing of switch_pair_1.gce

begin_circuit
    gelement type=triangle_2 y=x1 i0=0 tperiod=8m t0=0
+    g_high=1 g_low=-1 epsl=1u

    gelement type=const y=x2 c=0

    gelement type=switch_pair_1 x1=x1 x2=x2 y1=y1 y2=y2
+    t_delay=0.5m g_high=1
+    epsl=1.0e-4 delt_min=0.2u delt_nrml=0.2m

    outvar:
+    x1=var_of_x1
+    x2=var_of_x2
+    y1=var_of_y1
+    y2=var_of_y2
end_circuit

begin_solve
    solve_type=startup
    initial_sol initialize
    method: t_startup=0
end_solve

begin_solve
    solve_type=trns
    initial_sol previous
    begin_output
        filename=switch_pair_1_gce.dat limit_lines=10000
        variables: x1 x2 y1 y2
    end_output
    method: itmax_trns=10000
+    back_euler=yes
+    t_start=0 t_end=20m delt_const=0.20m delt_min=0.02u
+    n_wrtiterno=1000
    method: norm_2=1.0e-8
end_solve

end_cf

```

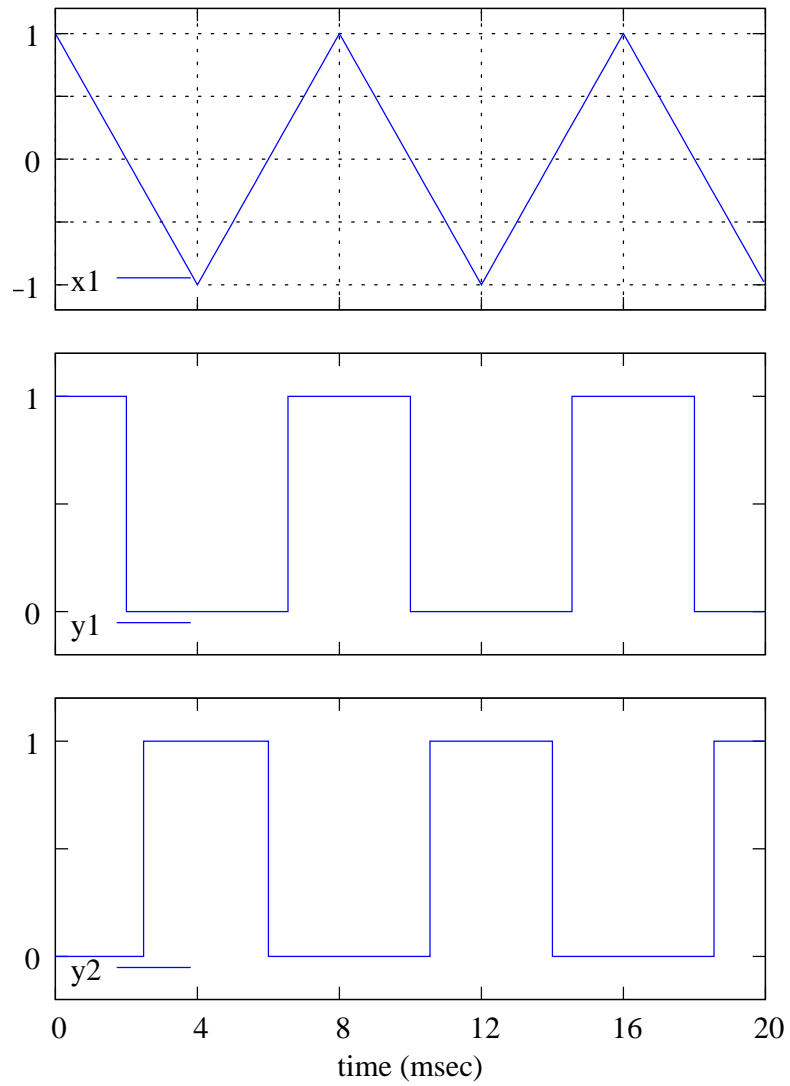


Figure 1: Waveforms obtained with `switch_pair_1.gce` (see the circuit file for details).