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
+    epsl=1.0e-6 delta_tmin=1.0e-6 delta_tnrml=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 `delta_tmin`, `delta_tnrml`, and `epsl` are used for controlling the simulator time steps. Additional time points are forced, depending on the values of `delta_tmin` and `delta_tnrml`, when `x1` and `x2` are within `epsl` of each other. This feature allows accurate simulation without having to make the average time step very small. Generally, `delta_tnrml` should be made equal to the typical simulator time step (`delt_const`) while `delta_tmin` 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 (available as `switch_pair_1_gce.in` in the examples directory) is reproduced 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 delta_tmin=0.2u delta_tnrml=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
```

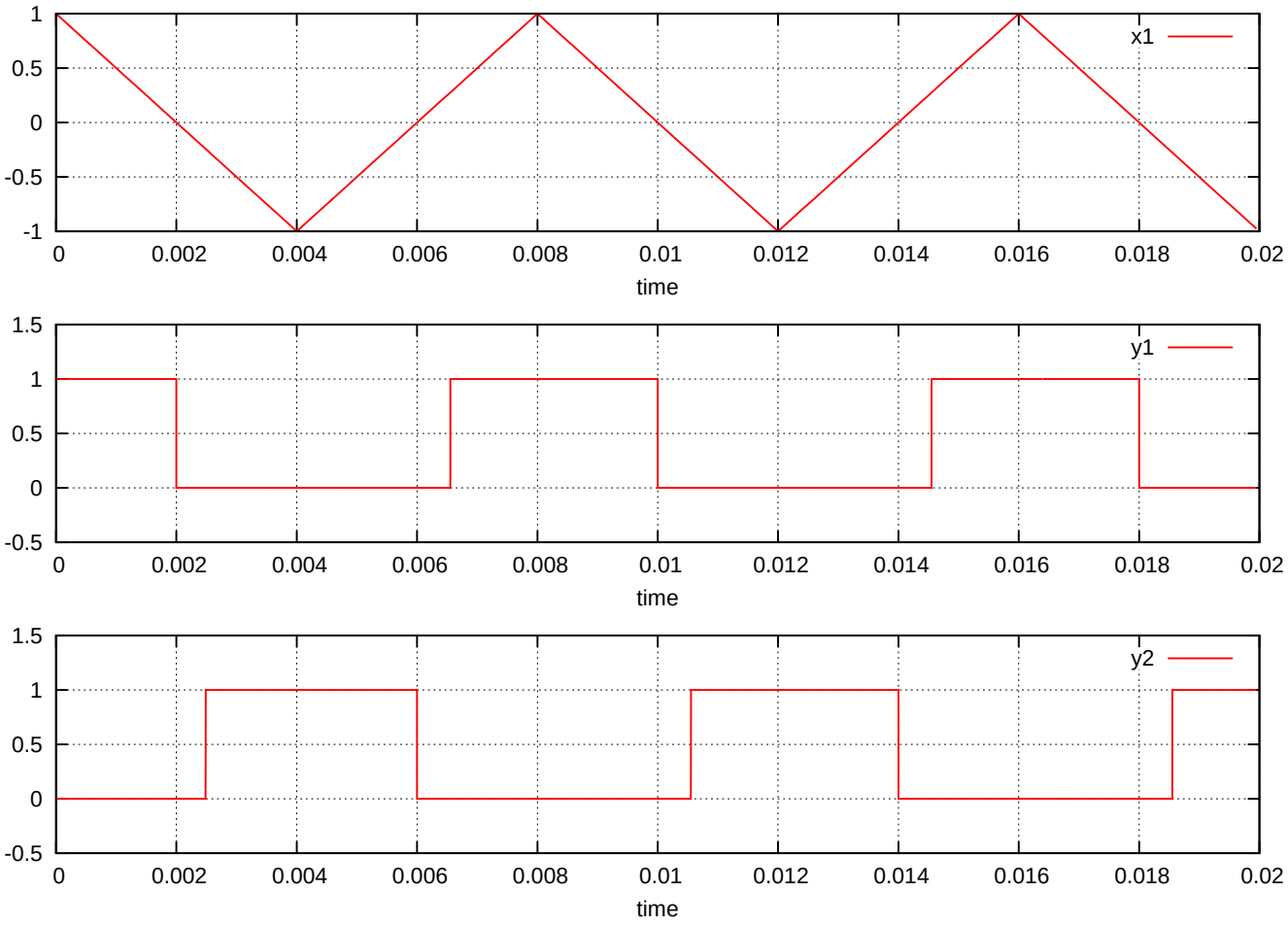

Figure 1: Waveforms obtained with `switch_pair_1.gce` (see the circuit file for details).