

## cmptr\_1.gce

### Attributes

```
mainvars: x1 x2 y
rparms: g_high=1.0 epsl=1.0e-6 delta_tmin=1.0e-6
+ delta_tnrml=1.0e-3
```

### Description

cmptr\_1.gce is a comparator which compares general variables  $x1$  and  $x2$ . The output  $y$  is  $g\_high$  if  $x1 > x2$ ; else, it is zero.

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 with `cmptr_1.gce`. The corresponding circuit file (available as `cmptr_1_gce.in` in the examples directory) is reproduced below.

```

title: testing of cmptrtr_1

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

  gelement type=triangle_2 y=x2 i0=1 tperiod=8m t0=0
+   g_high=1 g_low=-1 epsl=1u

  gelement type=cmptrtr_1 x1=x1 x2=x2 y=y g_high=1.2 epsl=1.0e-6
+   delta_tmin=0.20u delta_tnrml=1.00m

  outvar:
+   x1=var_of_x1
+   x2=var_of_x2
+   y=var_of_y
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=cmptrtr_1_gce.dat limit_lines=10000
    variables: x1 x2 y
  end_output
  method: itmax_trns=10000
+   back_euler=yes
+   t_start=0 t_end=20m delt_const=0.80m delt_min=0.1u
+   n_wrtiterno=1000
end_solve

end_cf

```

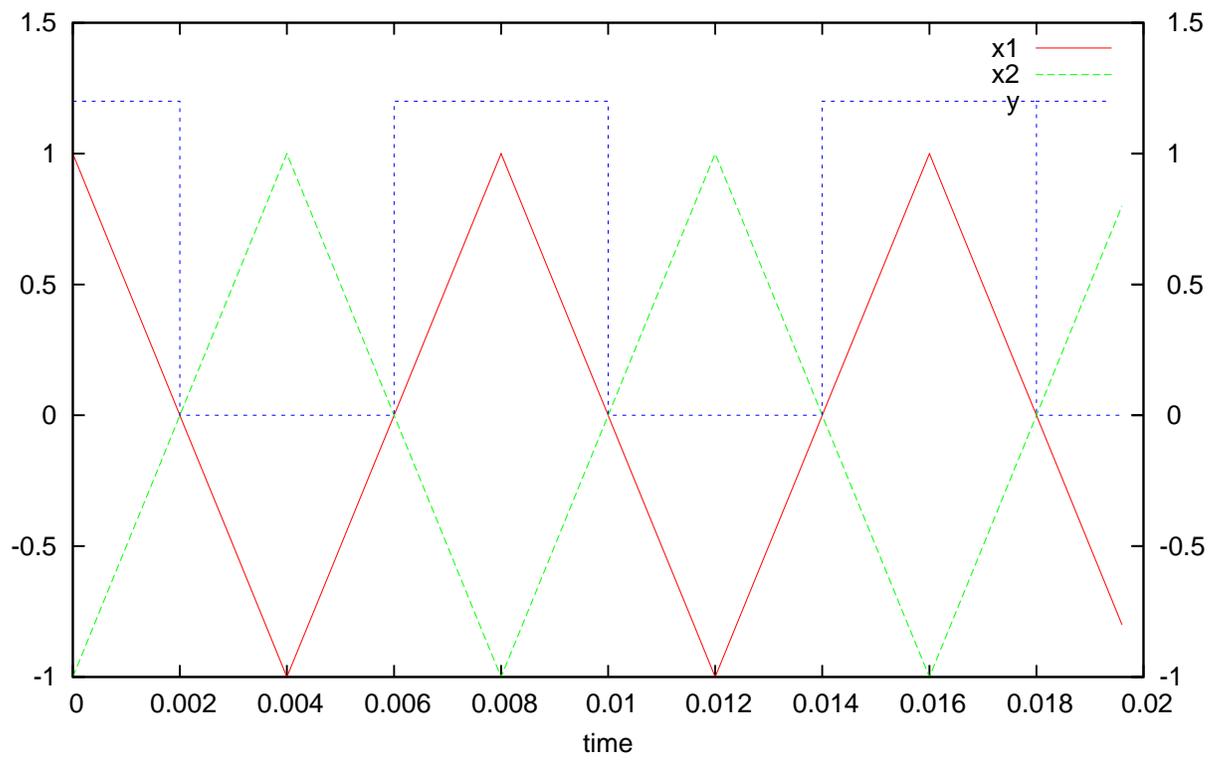


Figure 1: Waveforms obtained with `cmptrtr_1.gce` (see the circuit file for details).