

cmprtr_hyst_3.gce

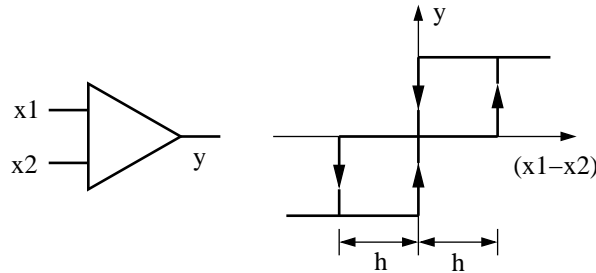


Figure 1: Input-output relationship for `cmprtr_hyst_3.gce`.

Attributes

```
mainvars: x1 x2 y
rparms: g_high=1.0 g_low=-1.0 eps1=1.0e-6 delt_min=1.0e-6
+   delt_nrml=1.0e-3 h=0.1
```

Description

`cmprtr_hyst_3.gce` is a comparator with hysteresis. It compares general variables `x1` and `x2`. The input-output relation is as shown in Fig. 1. The high value of the output is given by `g_high` and the low value by `g_low`.

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 $(x_1 - x_2) - x_0 \leq \text{eps1}$ (x_0 is $-h$, 0 , or $+h$). 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. 2 shows typical waveforms obtained with `cmprtr_hyst_3.gce`. The corresponding circuit file is given below.

```

title: testing of cmptrtr_hyst_3

begin_circuit
    gelement type=triangle_2 y=x1 i0=0 tperiod=8m t0=0
+    g_high=1.5 g_low=-1.5 epsl=1u

    gelement type=const y=x2 c=0
    gelement type=diff_2 x1=x1 x2=x2 y=x_diff
    gelement type=cmptrtr_hyst_3 x1=x1 x2=x2 y=y
+    g_high=1 g_low=-1.0 epsl=1.0e-15
+    delt_min=0.2u delt_nrml=0.80m h=0.5

    outvar:
+    x1=var_of_x1
+    x2=var_of_x2
+    y=var_of_y
+    x_diff=var_of_x_diff
end_circuit

begin_solve
    solve_type=startup
    initial_sol initialize
end_solve

begin_solve
    solve_type=trns
    initial_sol previous
    begin_output
        filename=cmptrtr_hyst_3_gce.dat limit_lines=10000
        variables: x1 x2 y x_diff
    end_output
    method: itmax_trns=10000
+    back_euler=yes
+    t_start=0 t_end=20m delt_const=0.80m delt_min=0.10u
+    n_wrtiterno=1000
end_solve

end_cf

```

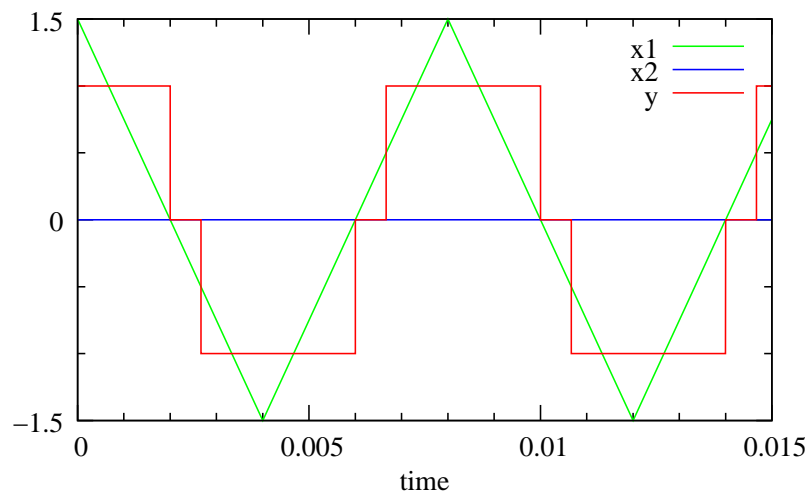


Figure 2: Waveforms obtained with `cmprtr_hyst_3.gce` (see the circuit file for details).