clock_4.gce

Attributes

```
  mainvars: y1 y2 y3 y4
  rparms: tperiod=0.02  g_high=1.0
+    dt1=0.01  dt2=0.01  alpha=10  beta=0
```

Description

`clock_4.gce` generates a set of four clock signals `y1`, `y2`, `y3`, `y4`. The four signals are related in a specific manner as will be illustrated in the following examples. The parameters have the following meaning:

`tperiod`: Period.

`g_high`: The amplitude of each of the four signals. The signals vary from 0 to `g_high`.

`dt1`: Width of the rising edges.

`dt2`: Width of the falling edges.

`alpha`: Angle (in degrees) which determines the duty cycle of the four signals. For example, if `alpha`=20°, then `y1` will be high for 2×(90-20)=140° and low for the remaining time. (One period corresponds to 360°.)

`beta`: An "offset" angle (in degrees) with respect to $t = 0$.

Note that the rising and faling edge widths are included in T_1 or T_2, the high and low intervals.

AC behaviour is not implemented.

The effect of the various paramters of `clock_4.gce` on the waveforms is shown in Figs. 1 and 2. The corresponding circuit file (available as `clock_4_gce.in` in the examples directory) is reproduced below.

```
title: testing of clock_4.gce

begin_circuit
   gelement type=clock_4
+    y1=y1 y2=y2 y3=y3 y4=y4
+    g_high=1 tperiod=1 dt1=0.01 dt2=0.01
+    alpha=20 beta=0
   gelement type=clock_4
+    y1=y5 y2=y6 y3=y7 y4=y8
+    g_high=1 tperiod=1 dt1=0.01 dt2=0.01
+    alpha=20 beta=120
   outvar:
+    y1=var_of_y1
+    y2=var_of_y2
+    y3=var_of_y3
+    y4=var_of_y4
+    y5=var_of_y5
+    y6=var_of_y6
+    y7=var_of_y7
+    y8=var_of_y8
end_circuit

begin_solve
   solve_type=dc
   initial_sol initialize
end_solve

begin_solve
   solve_type=trns
   initial_sol previous
   begin_output
      filename=clock_4_gce_1.dat
      variables: y1 y2 y3 y4
   end_output
   begin_output
      filename=clock_4_gce_2.dat
      variables: y5 y6 y7 y8
   end_output
   method: back_euler=yes
+    t_start=0 t_end=3.0 delt_const=0.1
+    delt_min=0.001
end_solve

end_cf
```

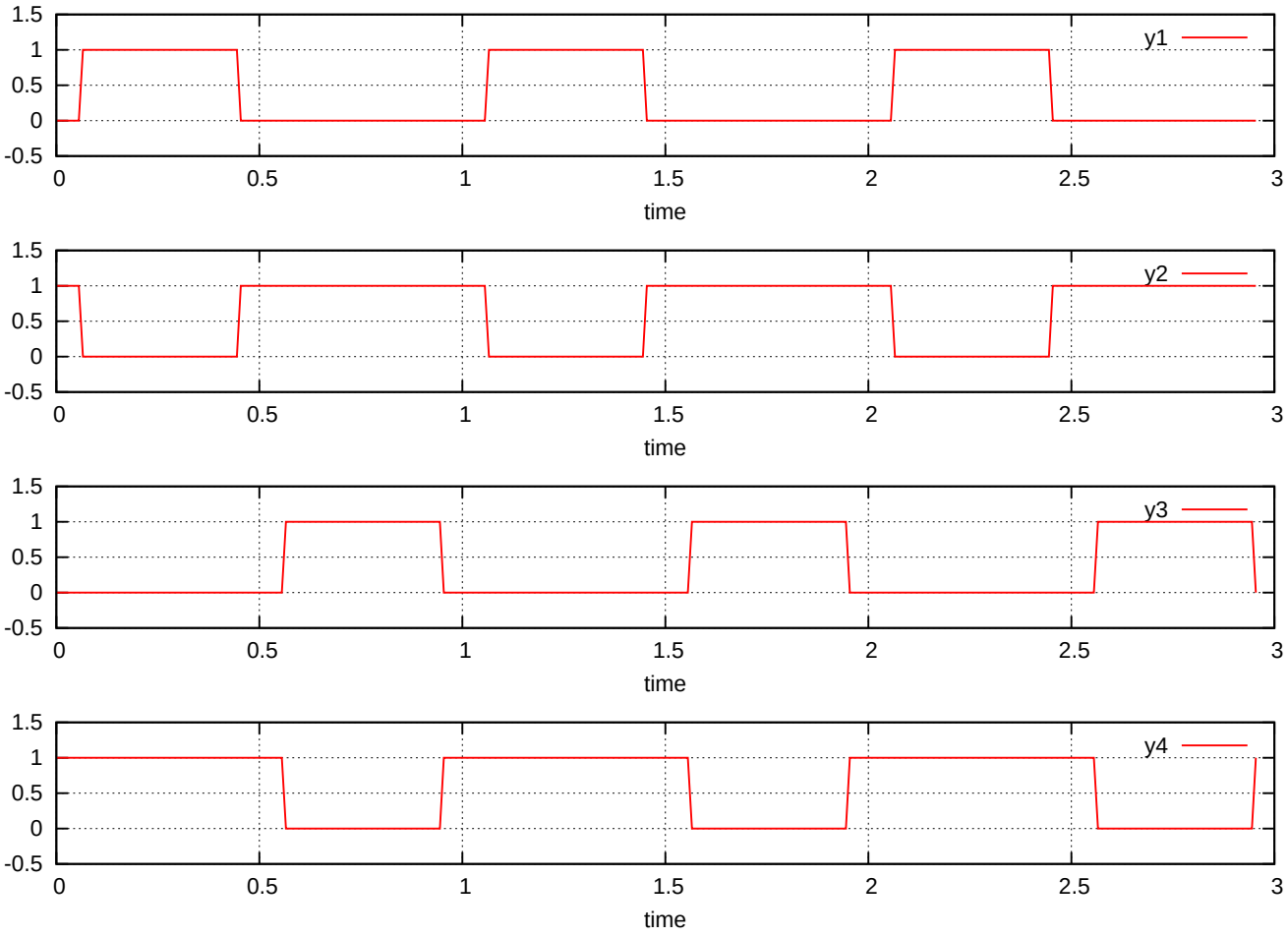

Figure 1: Waveforms obtained with `clock_4.gce` with `g_high`=1, `tperiod`=1, `dt1`=0.01, `dt2`=0.01, `alpha`=20, `beta`=0.

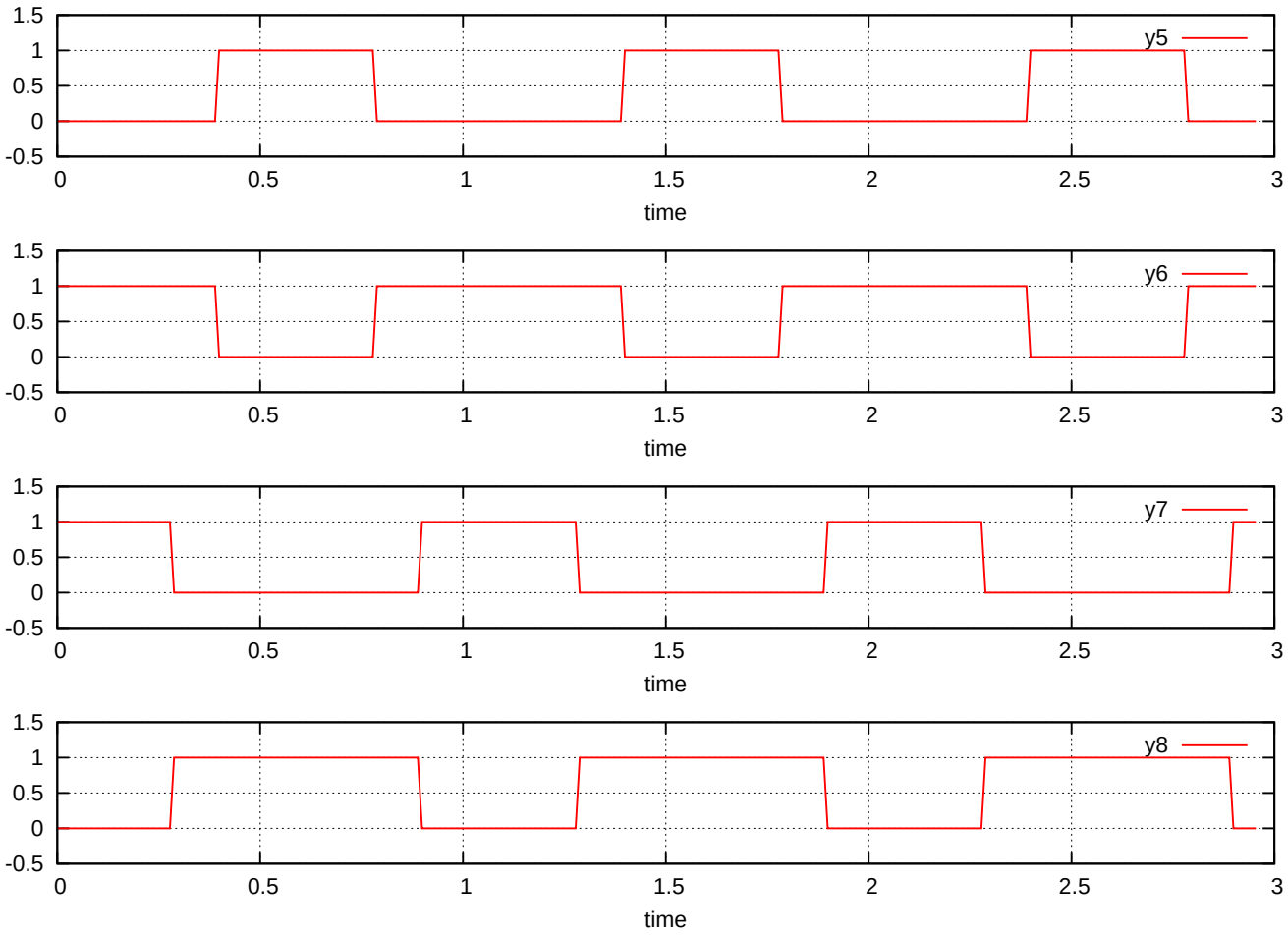

Figure 2: Waveforms obtained with `clock_4.gce` with `g_high`=1, `tperiod`=1, `dt1`=0.01, `dt2`=0.01, `alpha`=20, `beta`=120.