

## triangle\_2.ece

### Attributes

```

mainnodes: p n
outvar: i1=brc_of_v0 v1=brv_of_v0
iparms: i0=0
rparms:
+   tperiod=1   t0=0   v_high=1.0   v_low=-1.0
+   epsl=1.0e-9

```

### Description

**triangle\_2.ece** is a symmetric triangular wave voltage source connected between nodes **p** and **n**. The parameters have the following meaning:

**tperiod:** Period. In the first half, the voltage goes from **v\_high** to **v\_low** if **i0=0** (and from **v\_low** to **v\_high** if **i0=1**).

**t0:** An “offset” time interval. Its meaning will become clear in the following example.

**epsl:** Used in time step control. **epsl** can generally be set to be  $0.001 \times \min(t1, t2)$ .

The output variables **i1** and **v1** are the branch current and branch voltage, respectively.

AC behaviour is not implemented.

The effect of the various parameters of **triangle\_2.ece** on the waveforms is shown in Fig. 1. The corresponding circuit file (available as **triangle\_2\_ece.in** in the examples directory) is reproduced below.

```

title: testing of triangle_2.ece

begin_circuit
    eelement type=triangle_2 p=a n=0 tperiod=5 t0=0 i0=0
+    v_high=2 v_low=-2 epsl=1e-3

    eelement type=triangle_2 p=b n=0 tperiod=5 t0=0 i0=1
+    v_high=2 v_low=-2 epsl=1e-3

    eelement type=triangle_2 p=c n=0 tperiod=5 t0=1.5 i0=0
+    v_high=2 v_low=-2 epsl=1e-3

    eelement type=r p=a n=b r=1
    eelement type=r p=b n=c r=1

    refnode=0
    outvar:
+    va=nodev_of_a
+    vb=nodev_of_b
+    vc=nodev_of_c
end_circuit

begin_solve
    solve_type=startup
    initial_sol initialize
end_solve

begin_solve
    solve_type=trns
    initial_sol previous
    begin_output
        filename=triangle_2_ece.dat
        variables: va vb vc
    end_output
    method:
+    back_euler=yes
+    t_start=0 t_end=16 delt_const=0.5 delt_min=0.1
end_solve

end_cf

```

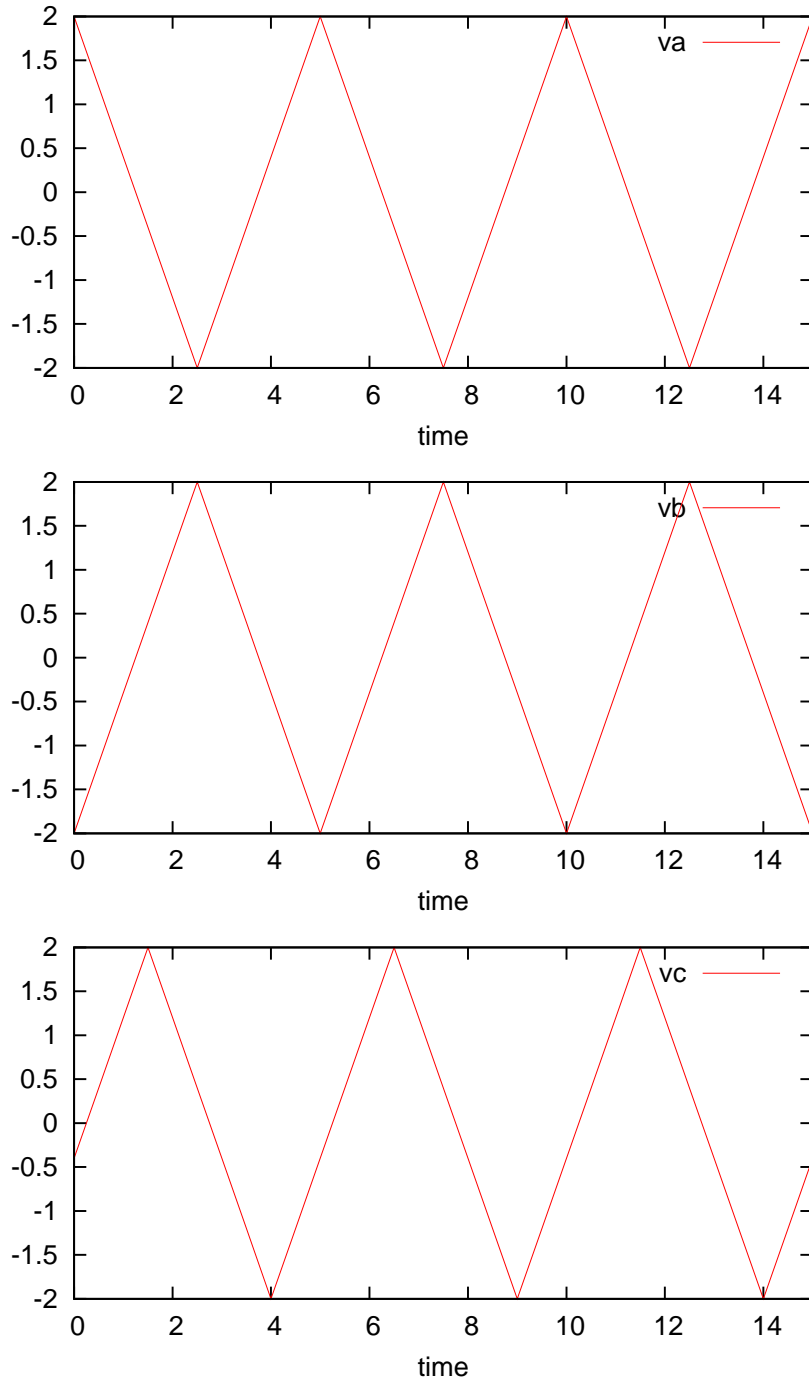


Figure 1: Waveforms obtained with `triangle2.ece`: (a) `va`: `tperiod=5`, `t0=0`, `i0=0`, `v_high=2`, `v_low=-2`, (b) `vb`: `tperiod=5`, `t0=0`, `i0=1`, `v_high=2`, `v_low=-2`, (c) `vc`: `tperiod=5`, `t0=1.5`, `i0=0`, `v_high=2`, `v_low=-2`.