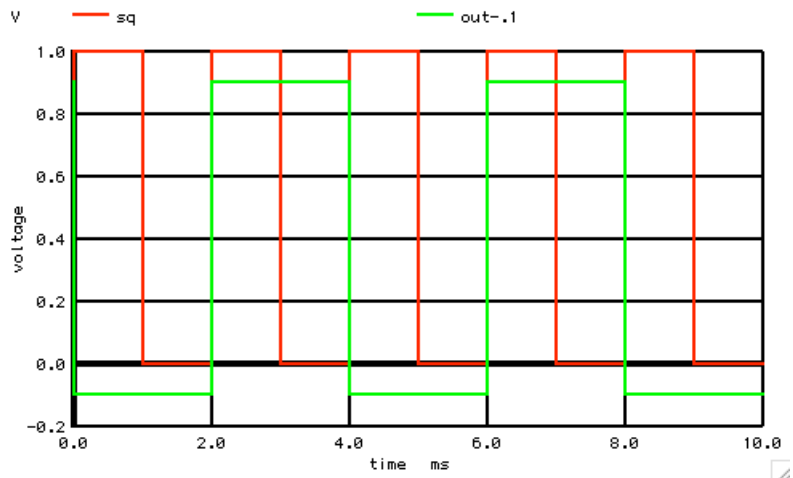


===== TOGGLE_FF_TESTS =====

**BEHAVIORAL MODELING OF FLIP FLIPS WITH FEEDBACK
MAY BE DIFFICULT TO CONVERGE WITHOUT USING
BREAK BEFORE MAKE LOGIC.**

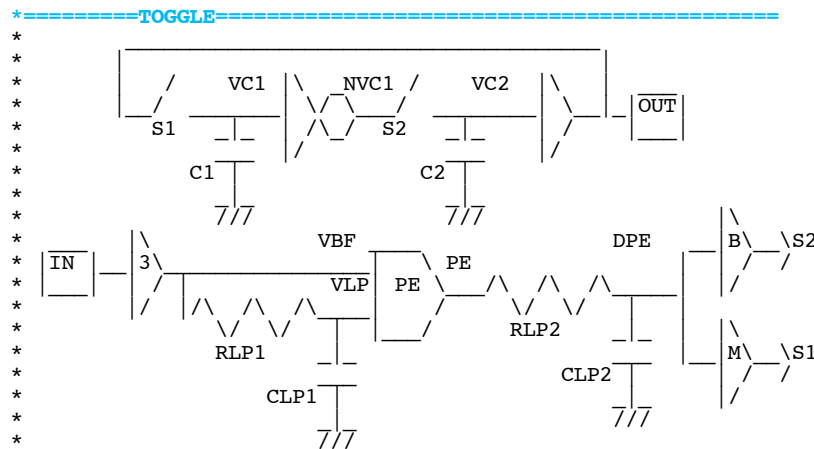


TOGGLE_FF_TESTS

```
=====Create Signal=====
*.OPTIONS  GMIN=1p          METHOD=trap   ABSTOL=1m     TEMP=27      srcsteps = 1  gminsteps = 1
*.OPTIONS  RELTOL=.001    ABSTOL=1p     VNTOL=1u     ITL4=500    ITL1=400
*V PULSE#  NODE_P NODE_N DC      VALUE  PULSE( VINIT VPULSE TDELAY TRISE TFALL  PWIDTH PERIOD )
VSQ       SQ      0        DC      0      PULSE( 0      1      1u      1u      1u      1m      2m )

XTOGGLE   SQ      OUT      TOGGLE

.control
set       pensize = 2
tran     1u  10m  0      1u
plot     sq  out-.1
.endc
```



```
*
*
*
*
*
*
*
*
*
*
*
*
*
*
*
*
*.SUBCKT TOGGLE IN OUT
BBUF VBF 0 V = u( v(IN) -.5 )
RLP VBF VLP 1k
CLP VLP 0 5n
BAND VPE 0 V = u( u(v(VBF) -.5)*u(.5 -v(VLP) ) -.5)
RLP2 VPE VLP2 .3k
CLP2 VLP2 0 2n
BBRK BRK 0 V = 1-u(v(VLP2) -.2)
BMAK MAK 0 V = u(v(VLP2) -.9)
S1 OUT VC1 MAK 0 SW
S2 NVC1 VC2 BRK 0 SW
C1 VC1 0 10n
C2 VC2 0 10n
R1 VC1 0 10Meg
R2 VC2 0 10Meg
BINV NVC1 0 V = 1-u(v(VC1) -.2)
BOUT OUT 0 V = u(v(VC2) -.2)
*
*
*
*
*
*
*
*
*
*
*
*
*
*
*
```

```
.ENDS TOGLE
.MODEL SW VT=.5 VH=.1 RON=1 ROFF=100MEG)
.end
```