Atlas

Solution Specification

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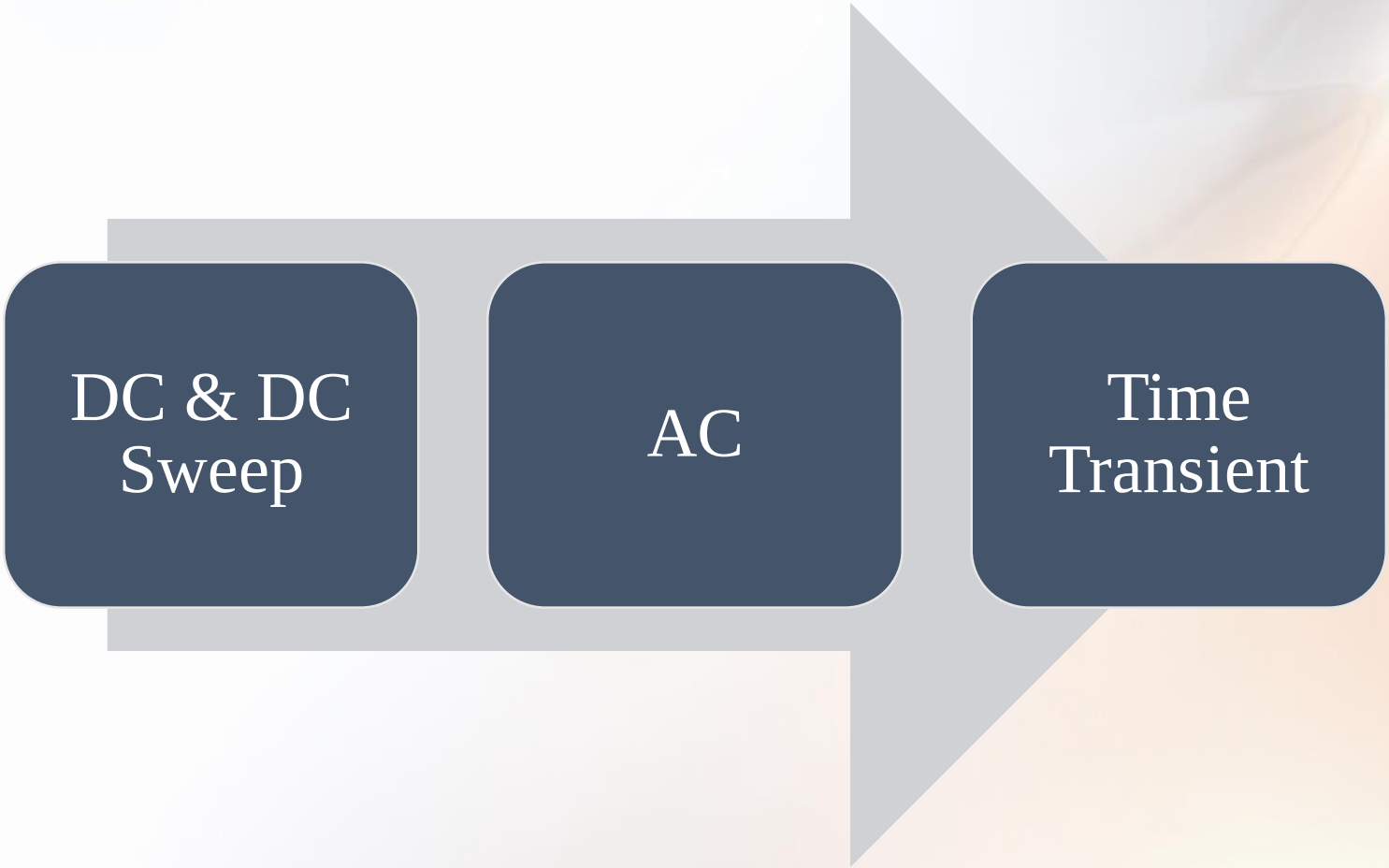
Analysis types



DC Solution

- Voltage on each electrode is specified using the SOLVE statement. For example:
  - SOLVE VGATE=1.0
  - SOLVE VGATE=2.0

- When the voltage on any electrode is not specified in a given SOLVE statement, the value from the last SOLVE statement is assumed. If the voltage on a particular electrode is never defined on any SOLVE statement, it defaults to zero.

DC Sweep

- To ramp the base voltage from 0.0V to 1.0V with 0.05V steps with a fixed collector voltage of 2.0V, use the following syntax:

SOLVE VCOLLECTOR=2.0

SOLVE VBASE=0.0 VSTEP=0.05 VFINAL=1.0 NAME=base

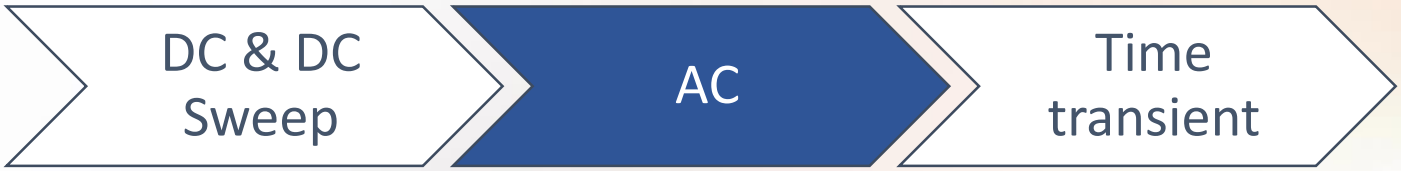
- The Electrode name is case-sensitive!

AC solution

- The results of AC simulations are the conductance and capacitance between each pair of electrodes.

- Two types of AC analysis is available in ATLAS:

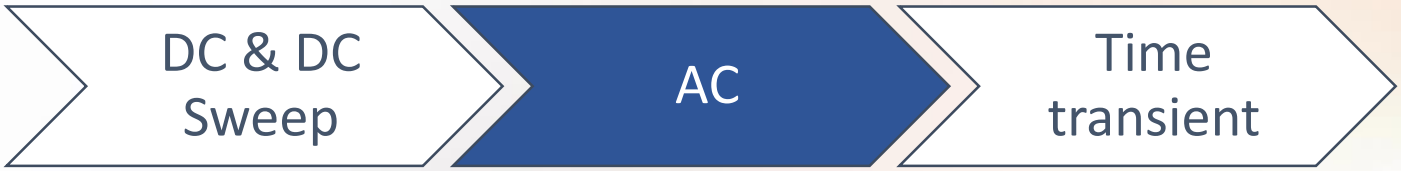
1. Single Frequency AC Solution During A DC Ramp
2. Ramped Frequency At A Single Bias



Single Freq. AC During A DC Ramp

- Set an AC signal on an existing DC ramp is just the AC flag and the setting of the small signal frequency. For example:

SOLVE VBASE=0.0 VSTEP=0.05 VFINAL=1.0 NAME=base AC FREQ=1.0e6

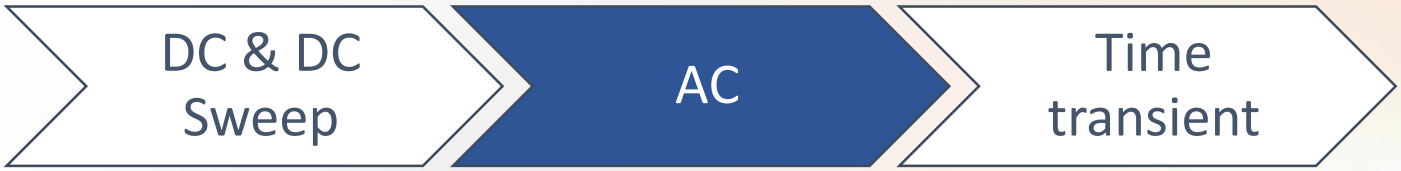


Ramped Freq. At A Single Bias

SOLVE VBASE=0.7 AC FREQ=1e9 FSTEP=1e9 NFSTEPS=10

SOLVE VBASE=0.7 AC FREQ=1e6 FSTEP=2 MULT.F NFSTEPS=10

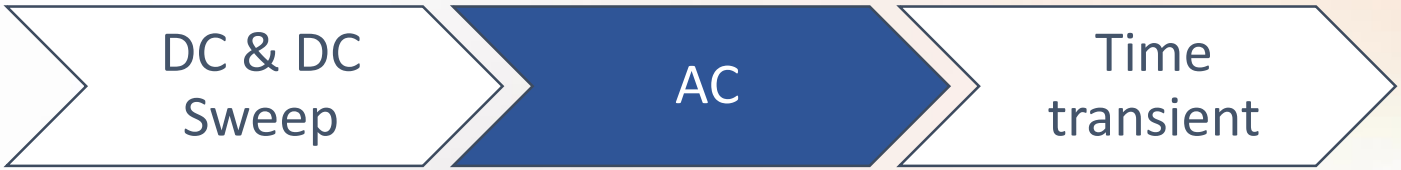
- The first case ramps the frequency linearly from 1GHz to 11GHz in 1GHz steps.
- The second example doubles the frequency in successive steps from 1MHz to 1.024GHz. The MULT.F parameter is used to specify that FSTEP is a unitless multiplier for the frequency.



Combination of the two cases

- In the following statement the frequency ramps are done at each bias point during the DC ramp.

```
SOLVE  VBASE=0.0  VSTEP=0.05  VFINAL=1.0  NAME=base \
AC  FREQ=1.0e6  FSTEP=2  MULT.F  NFSTEPS=10
```



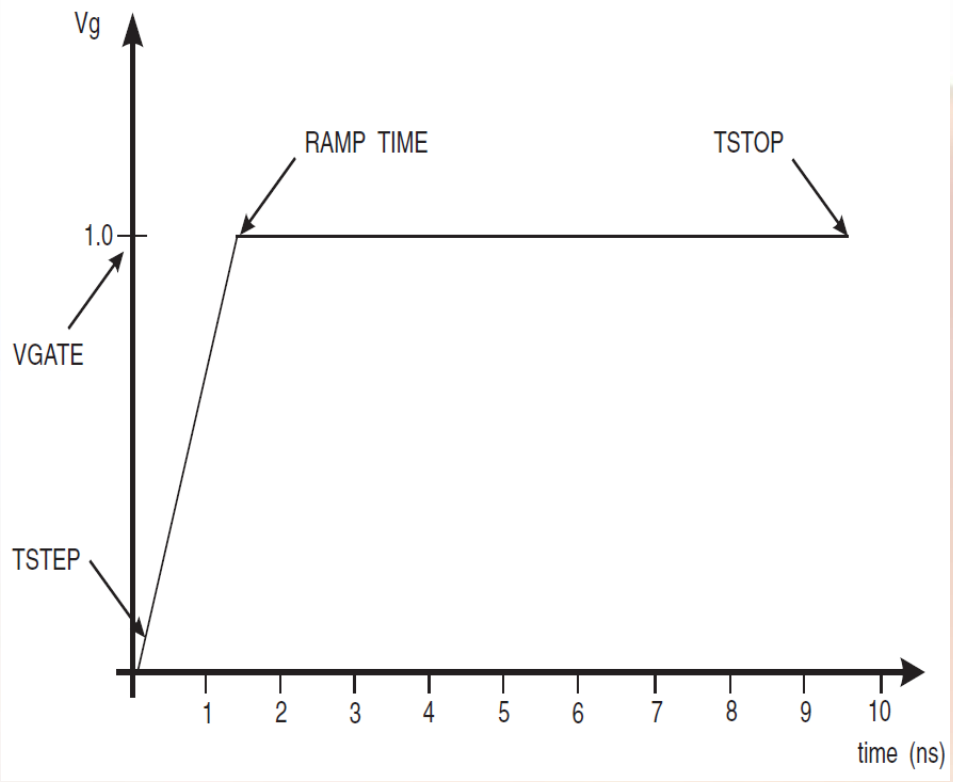
Transient solution

1. Pulse: “SQPULSE” + TDELAY, TRISE, PULSE.WIDTH, TFALL, and FREQUENCY
2. Sinusoidal: “trans.analy” + FREQUENCY
3. Simple ramp: + ramptime

Transient solution

Example:

SOLVE VGATE=1.0
RAMPTIME=1E-9
TSTOP=10e-9 TSTEP=1e-11



DC & DC Sweep → AC → Time Transient

More about Silvaco TCAD

http://ucourse.ir/open-courses/silvaco/