

source functions only affect the behavior of a module during small-signal analyses. The small-signal analyses provided by *SPICE* include the AC and noise analyses, but others are possible. When not active, the small-signal source functions return zero (0).

5.0.1 Analysis

The `analysis()` function takes one or more string arguments and returns one (1) if any argument matches the current analysis type. Otherwise it returns zero (0). The general form is

```
analysis( analysis_list )
```

There is no fixed set of analysis types. Each simulator can support its own set. However, simulators shall use the types listed in Table <\$chapnum>-22 to represent analyses which are similar to those provided by *SPICE*.

Table <\$chapnum>-22—Analysis types

Name	Analysis description
"ac"	.AC analysis
"dc"	.OP or .DC analysis (single point or dc sweep analysis)
"noise"	.NOISE analysis
"tran"	.TRAN analysis
"ic"	The initial-condition analysis which precedes a transient analysis.
"static"	Any equilibrium point calculation, including a DC analysis as well as those that precede another analysis, such as the DC analysis which precedes an AC or noise analysis, or the IC analysis which precedes a transient analysis.
"nodeset"	The phase during an equilibrium point calculation where nodesets are forced.

Any unsupported type names are assumed to not be a match.

Table <\$chapnum>-23 describes the implementation of the analysis function. Each column shows the return value of the function. A status of one (1) represents *True* and zero (0) represents *False*.

Table <\$chapnum>-23—Return values for analysis functions

Analysis	Argument	DC	Sweep ^a dc1 dc2	TRAN op Tran	AC op AC	NOISE op AC
First part of "static"	"nodeset"	1	1 0	1 0	1 0	1 0
Initial DC state	"static"	1	1 1	1 0	1 0	1 0
Initial condition	"ic"	0	0 0	1 0	0 0	0 0
DC	"dc"	1	1 1	0 0	0 0	0 0
Transient	"tran"	0	0 0	1 1	0 0	0 0

Table <\$chapnum>-23—Return values for analysis functions, *continued*

Analysis	Argument	DC	Sweep ^a dc1 dc2	TRAN op Tran	AC op AC	NOISE op AC
Small-signal	"ac"	0	0 0	0 0	1 1	0 0
Noise	"noise"	0	0 0	0 0	0 0	1 1

- a. Sweep refers to a DC analysis over a parameter sweep and is a super set of a single point dc analysis. dc1 and dc2 above refer to dc points within the same sweep analysis.

Using the **analysis()** function, it is possible to have a module behave differently depending on which analysis is being run.

Examples:

To implement nodesets or initial conditions using the analysis function and switch branches, use the following.

```

if ( analysis( "ic" ) )
    V(cap) <+ initial_value;
else
    I(cap) <+ ddt( C * V( cap ) );

```

5.0.2 DC Analysis

VerilogAMS supports a single-point DC analysis and also a multipoint DC Sweep analysis where multiple DC points are done over a sweep of parameter values. An operating point analysis is done for each DC point in the sweep. Doing a single point dc analysis is the same as an operating point analysis. The **analysis("dc")** and **analysis("static")** functions will return true for a single point DC analysis and also for every dc point in a sweep analysis. The **analysis("nodeset")** will return true only for the first DC point in the sweep analysis and return false for rest of the DC points.

The variable values shall be rotated between two subsequent DC points within the same DC Sweep analysis. The values of variables in the previous DC point will be used as the starting values for the next DC point. However, variable values shall not be carried over across two independent dcsweep analysis (from the end of one dcsweep analysis to the start of the next dcsweep analysis). Each independent dcsweep analysis shall calculate its own operating point.

5.0.3 AC stimulus

A small-signal analysis computes the steady-state response of a system which has been linearized about its operating point and is driven by a small sinusoid. The sinusoidal stimulus is provided using the **ac_stim()** function. The general form is

```

ac_stim( [analysis_name [ , mag [ , phase ] ] ] )

```

The AC stimulus function returns zero (0) during large-signal analyses (such as DC and transient) as well as on all small-signal analyses using names which do not match