Maths Calculations in LTSpice

## Arithmetic Operations

|  |  |
| --- | --- |
| **Symbol** | **Description** |
| + | Addition |
| - | Subtraction |
| \* | Multiplication |
| / | Division |

## Functions

### Basic Math Functions

|  |  |
| --- | --- |
| **Function** | **Description** |
| exp(x) | Exponential |
| ln(x) | Natural Logarithm |
| log10(x) | Base-10 Logarithm |
| sqrt(x) | Square Root |

### Trigonometric Functions

|  |  |
| --- | --- |
| **Function** | **Description** |
| sin(x) | Sine |
| cos(x) | Cosine |
| tan(x) | Tangent |

### Hyperbolic Functions

|  |  |
| --- | --- |
| **Function** | **Description** |
| sinh(x) | Hyperbolic Sine |
| cosh(x) | Hyperbolic Cosine |
| tanh(x) | Hyperbolic Tangent |

## Derivatives and Integrals

|  |  |
| --- | --- |
| **Function** | **Description** |
| ddt(expression) | Derivative |
| idt(expression) | Integral |

## Time and Frequency Calculations

- `time` is a built-in variable that represents the simulation time during transient analysis.

For example: `V=sin(2\*pi\*1000\*time)` for a 1 kHz sine wave.

## Fourier Analysis

- LTSpice can calculate the Fourier components of a waveform:

- Output magnitude, phase, and harmonics of signals.

- Fourier transform is used to analyze frequency domain properties.

## Custom Mathematical Operations via `.MEASURE`

Using `.measure` directives, you can:

- Compute average values, maximum, minimum, and RMS values.

- Integrate waveforms and calculate time delays, rise times, and fall times.

## Complex Numbers

LTSpice supports operations with real and imaginary parts in AC analysis.

## Plotting Mathematical Expressions

You can create custom plots using mathematical expressions in the waveform viewer. For example:

- To plot the product of two signals: `V(node1)\*V(node2)`

- To calculate the power delivered: `V(node)\*I(device)`