

noise

keys:	[from]	<number>	source picture
	[to]	<number>	output picture
	width	<number>	width of noise distribution (standard deviation if gaussian or negative exponential noise, maximum if uniform)
	dose	<number>	number of quanta per pixel in poisson-noise simulation
options:	uniform/exponential		specify uniform or negative exponential noise distribution
	preset		if <i>dose</i> , rescale using existing values of <i>mean</i> , <i>me2</i> instead of finding picture mean

noise adds pseudo-random noise to a picture, to simulate the noise that might be observed experimentally. Gaussian, poisson, uniform and negative exponential noise distributors are provided.

Examples

```
noise 1 to 3 width .5
```

This command adds gaussian distributed noise, with a standard deviation of 0.5, to picture 1, storing the result as picture 3.

```
noise 51 dose 8
```

This command replaces picture 51 by a poisson noise ('shot' noise) limited version, with an average of 8 quanta per pixel.

Description

By default, **noise** adds gaussian distributed noise with a standard deviation width of 0.1. You can also apply the following forms of noise distribution:

- poisson
- uniform
- negative exponential

Use the **dose** key to specify a poisson noise-limited version of the source picture. Semper rescales the output to have the same mean as the source (and therefore a similar range). Use the **uniform** option to add uniformly distributed noise in the range 0 to **width**. If you use the **exponential** option it adds negative exponentially distributed noise with standard deviation **width**. This form of noise is typical of diffraction patterns, that is, power spectra.

Semper 6 Command Reference

noise

If you have a complex source picture, the real and imaginary parts are processed independently (with the same value of **width**). If you are adding poisson noise, the source picture must be non-negative as **noise...dose** faults any negative pixel values in the source picture. You can speed the process by using the **preset** option, if the mean of the picture is already recorded in the variables *mean* and *me2*. **preset** uses these mean values instead of scanning the picture directly.

The random number generator 'seed' used by **noise** is held in the Semper variable *rnm*, and you can initiate reproducible 'random' sequences of noise by setting this yourself.

Notes

multi-layer pictures: all layers processed
forms used internally: fp, complex
variables used: *rnm* (random number generator 'seed') in the range 0 to 1
mean, *me2* (if **preset**, mean of picture)
variables set: *mean*, *me2* (if not **preset**)

Defaults and Ranges

keys/options	defaults	range
[from]	current picture, held in the variable <i>select</i>	valid picture number
[to]	source picture	valid picture number
width	0.1	real number in the range 0 to 1
dose	<i>gaussian</i> noise added	positive integer
uniform/ exponential	<i>gaussian</i> noise added	