

jitter means that the average phase shift is zero but the instantaneous phase shift has a few millidegrees of noise. This shows up at the output as noise in phase or quadrature measurements.

Phase noise can also cause noise to appear at the X and Y outputs. This is because a reference oscillator with a lot of phase noise is the same as a reference whose frequency spectrum is spread out. That is, the reference is not a single frequency, but a distribution of frequencies about the true reference frequency. These spurious frequencies are attenuated quite a bit but still cause problems. The spurious reference frequencies result in signals close to the reference being detected. Noise at nearby frequencies now appears near DC and affects the lock-in output.

Phase noise in the SR830 is very low and generally causes no problems. In applications requiring no phase jitter, the internal reference mode should be used. Since there is no PLL, the internal oscillator and the reference sine waves are directly linked and there is no jitter in the measured phase. (Actually, the phase jitter is the phase noise of a

crystal oscillator and is very, very small).

Harmonic Detection

It is possible to compute the two PSD reference sine waves at a multiple of the internal oscillator frequency. In this case, the lock-in detects signals at $Nx_{f_{ref}}$ which are synchronous with the reference. The SINE OUT frequency is not affected. The SR830 can detect at any harmonic up to $N=19999$ as long as $Nx_{f_{ref}}$ does not exceed 102 kHz.