Contribution ID: **44** Type: **Oral**

Properties of a Distortion-Compensating Phase Calibration Processor

Friday, 4 October 2013 14:05 (25 minutes)

When designing a downconverting RF measurement system, there is a perennial tradeoff choosing the signal level at the mixer. Too low, and Johnson noise at its output limits the precision of the measurement. Too high, and distortion generated in the mixer (characterized by its IP3) causes systematic errors in the measurement. Superimposing calibration tones (also known as pilot tones) on the input, as is necessary for cable drift compensation, is thought of as aggravating the situation. Here, we present and analyze a digital-signal-processing (DSP) mechanism that can characterize and correct distortion of a two-tone (pilot tone plus unknown signal) system. This opens up the possibility of running mixers with higher signal strengths than before.

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Session Classification: Session 3: Phase Calibration