# ANTENNA NEAR-FIELD RANGE ASSESMENT

## Near-field Range Evaluation Using NIST 18-Term Error Model

Any antenna range, be it near-field or far-field, is subject to error sources which should be carefully analyzed and evaluated to not only determine the expected measurement accuracy, but to identify ways of improving accuracy. The near-field industry has adopted an evaluation technique based on a set of error terms first proposed by NIST ("Error Analysis Techniques for Planar Near-field Measurements", IEEE Trans. Antenna and Prop. Vol.36, no.6, June 1988, by Allen Newell).

The NIST 18-Term Error Analysis uses a combination of mathematical analysis, computer simulation and near-field measurements to estimate the antenna measurement uncertainty for a given frequency, antenna, and facility. NPM has extensive experience in performing complete range evaluations for antenna gain, side lobe levels, cross-pol levels, and beam pointing errors. During system installation and training, we typically include a brief overview of the range evaluation process. Upon request, we can provide a quotation for a complete range accuracy evaluation of your facility. Range assessment includes on-site testing, analysis, report, and recommendations for improving measurement accuracy.

### OVERVIEW
We provide range assessments for near-field measurement facilities.

### EVALUATION OF
Antenna gain, side lobe level, cross-polarization, and/or beam-pointing accuracy.

### OPTIONAL
In some circumstances, we can offer a lower cost option by providing a mini assessment based on a limited number of error terms. Please contact us to discuss your specific requirements.

| No. | Item | Uncertainty (dB) | S/E Level (dB) | Source |
|-----|------|------------------|----------------|--------|
| 1 | Probe relative pattern | 0.10 | -39 | OEWG model |
| 2 | Probe polarization ratio | | | N/A |
| 3 | Probe gain measurement | | | N/A |
| 4 | Probe alignment error | 0.2 | -33 | Error calc at 60 deg |
| 5 | Normalization constant | | | N/A |
| 6 | Impedance mismatch error | | | N/A |
| 7 | AUT alignment error | | | N/A |
| 8 | Data point spacing (aliasing) | 0.15 | -35 | Aliasing test |
| 9 | Measurement area truncation | 0.04 | -45 | Truncation test |
| 10 | Probe XY position errors | 0.01 | -58 | X error map |
| 11 | Probe Z position error | 0.14 | -36 | Z error map |
| 12 | Mutual coupling (Probe/AUT) | 0.27 | -30 | 1/4 wave test |
| 13 | Receiver amplitude linearity | 0.15 | -35 | Attenuator test |
| 14 | System phase error | 0.15 | -35 | System phase test |
| 15 | Receiver dynamic range | 0.48 | -25 | S/N and calc |
| 16 | Room scattering | 0.27 | -30 | 1/4 wave test |
| 17 | Leakage and crosstalk | 0.03 | -50 | Loaded port test |
| 18 | Random amplitude/phase errors | 0.15 | -35 | Repeatability |
| | **RSS Total =** | **0.75** | **21** | |

Example of -30dB Sidelobe Uncertainty Budget Using NIST 18-Term Error Model

NEXT PHASE MEASUREMENTS