Measurement Uncertainty in Predicting Diameter from Polarizabilities during Anomaly Resolution  
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Increased emphasis is being placed on the anomaly resolution process and the ability to match the AGC predicted size, shape and wall thickness to the intrusively recovered source. Originally set as a qualitative metric, differences of opinion as to what constitutes a match has led practitioners to look at quantitative metrics for this process. This paper examines the DoD Library data to establish errors bars on the correlation between polarizability and diameter. Using the high-quality test stand data from the DoD Library, a Self-Match is conducted and the diameter of the matching targets is compared to that of the original Library item. Diameter mismatch is found to correlate with target size and match metric. Larger targets and poorer match metrics have a larger range of diameter mismatch. Several options for quantifying this dependence are proposed. Polarizability curves are also examined for their applicability to resolving mismatches. Size/shape/thickness details of individual sources can be explained for many of the mismatched sources, but this relies on near perfect measurements and differences may be smaller than other factors such as measurement noise and target orientation. Also, there is no way to quantify the justification, which was the objective of the study. Examination of polarizability curves therefore remains a subjective justification of nonconforming sources.