A Look at Monostatic to Bistatic Equivalence Theorems

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The purpose of this work is to quantitatively determine the limits of the extension to Kell's Monostatic to Bistatic Equivalence Theorem (MBET) developed by Falconer. Falconer developed two extensions to Kell's MBET: one applicable to near zone data, and one valid in the far zone region. Work encompasses collecting and analyzing both monostatic and bistatic radar cross section (RCS) data for perfect electric conductor (PEC) targets. The research analyzes the effects of varying the parameters of transmission frequency, target shape complexity, and receiver bistatic angle. Targets range in geometric complexity from canonical objects comprised of simple scatterers to multifaceted composites that sustain numerous interactions.

Empirical data are compared to analytical predictions produced by a Method of Moments electromagnetic computer code, to verify validity of collected data. The code is run at X-band through K-band frequencies for a comparison with target data. Further, the empirical bistatic data is compared to the estimate produced by the MBET, to ascertain the region in which the MBET approximation is applicable.