MIMO RADAR DEMYSTIFIED AND ITS CONVENTIONAL EQUIVALENTS

DR. ELI BROOKNER
RAYTHEON CO. (RETIRED)
EMAIL: ELI.BROOKNER@GMAIL.COM, Tel: 781-862-7014

IEEE AESS DISTINGUISHED LECTURE TALKS

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This talk is given in tutorial form using a simple explanation starting from basics of phased arrays and how they work. Physical insight into MIMO is given. No heavy math used. It has been shown in the literature that MIMO radars can provide orders of magnitude better resolution and accuracy than conventional radars. We show how to use conventional radars to do as well.

It has been also shown that a MIMO airborne GMTI radar can provide a better minimum detectable velocity (MDV) than a conventional one. Here we show that a conventional array radar can be used for the GMTI system to provide the same advantages as the MIMO system relative to coherent dwell time and aperture size and thus should provide the same MDV.

We show that conventional equivalents to MIMO radar systems can do just as well as the MIMO systems in rejecting barrage-noise jammers, repeater jammers, hot-clutter jammers (jammer signals reflected from the ground) and main-lobe jammers.

We show that the signal processing load for the MIMO radar system can typically be much larger than for its conventional equivalents.

Bio of Dr. Eli Brookner: **Bach Sc City College of New York, DrSc from Columbia University '62. Worked on marine, Air Traffic Control, ballistic missile defense, space radars and phased arrays at Raytheon 1962-2015 (retired). 1952-1962 at: Columbia University, Nicolet, Rome AF Lab. IEEE 2006 Dennis Picard Medal for Radar Technology & Application; IEEE '03 Warren White Award; 1966 Journal of Franklin Institute Premium Best Paper Award; 1998 Best Applications Paper IEEE Wheeler Prize. Fellow: IEEE, AIAA, MSS. 4 popular books on radar, arrays, tracking. Gave courses to >10,000 in 25 countries. Banquet/keynote speaker 13 times. >230 papers, talks, correspondences of which >100 invited. 6 papers in Books of Reprints. Contributed chapters to three books. 9 patents.**

MULTIPLE-INPUT MULTIPLE-OUTPUT (MIMO)
AT THAIPUSAM FESTIVAL, SINGAPORE

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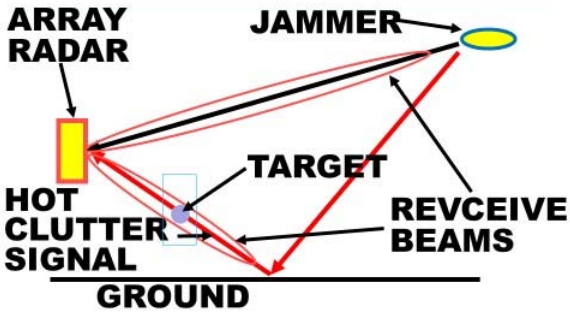
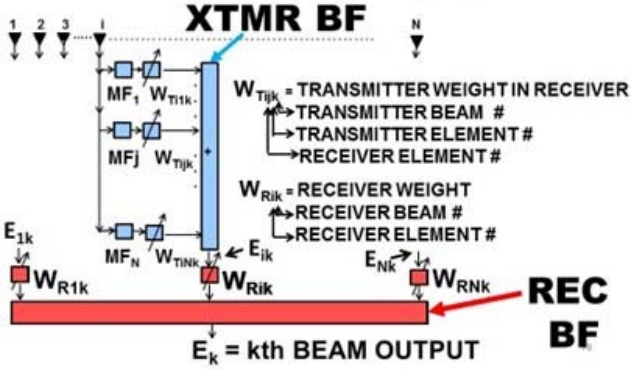
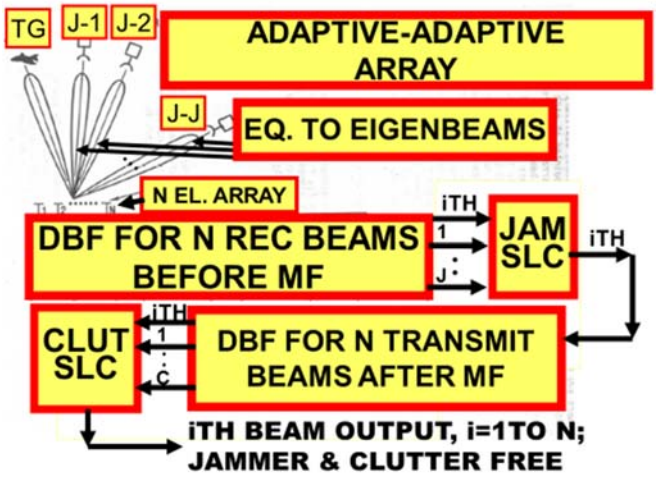
HOT CLUTTER



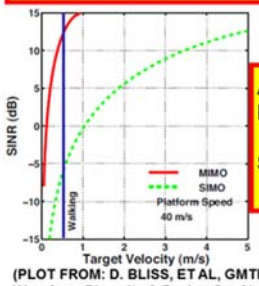
MIMO MONOSTATIC ARRAY

XTMR/REC BEAMFORMER (BF) IN REC





IS MIMO BETTER FOR GMTI? NO!
CONVENTIONAL MIMO SHOULD DO AS WELL USING SAME THIN/FULL ARRAY WITH SAME COHERENCE TIME



ASSUMPTIONS:
MIMO: THIN/FULL ARRAY, N=5
SIMO(CONVENTIONAL): FULL ARRAY, N=5

(PLOT FROM: D. BLISS, ET AL, GMTI MIMO Radar, 2009 International Waveform Diversity & Design Conf.)