

Antenna Array Digital Beamforming

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Tutorial Description

Digital beamforming (DBF) is a powerful technique to enhance antenna performance. DBF arrays digitize the received signals at the element level, thus preserving the total information available at the aperture, and then process these signals in the digital domain. In the transmit mode DBF provides ultimate control of the radiated wave form and beam shape. With the progress in VLSI circuitry and digital processors the A/D converter is moving ever closer to the actual antenna in radar and communication systems.

In this tutorial we will cover 1) Introduction to DBF systems and basic features, 2) components: A/D converters, D/A converters, receivers, 3) typical applications: spatial multiplexing, element decoupling, open-loop nulling, super resolution, basics of multiple- input / multiple-output (MIMO) systems, 4) partial DBF and subarraying, and 5) examples of systems.

Instructor – Hans Steyskal



Hans Steyskal received the degrees Civ. Ing., Tekn. Lic., and Tekn. Dr. in electrical engineering from the Royal Institute of Technology (KTH), Stockholm, Sweden.

In 1962 he joined the Swedish National Defence Research Establishment (FOA) where he investigated microwave radiation and scattering problems. From 1980 to 2007 he was with the AF Research Laboratory, Antenna Technology Branch, Hanscom AFB, MA where he pursued his research interests in electromagnetics, phased array antennas, digital beamforming and array signal processing. In 2007 he retired from his position as Senior Scientist, Antennas, and now works as an AFRL on-site contractor.

Dr. Steyskal has held a part-time position as Adjunct Professor in Antenna Technology at KTH during 1996-2004, and has spent time as a Visiting Scientist at the Polytechnic University of New York and at The Federal Institute of Technology, Lausanne, Switzerland. He has

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