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About the Author

Luke Rosenberg received his BE (Elec.) with Honours from Adelaide University in 1999 and joined DSTO in January 2000. Since this time he has completed both a Masters degree in Signal and Information Processing and a PhD in Multichannel Synthetic Aperture Radar through Adelaide University. He has worked at the DSTO as an RF engineer in the missile simulation centre and now as a research scientist in the imaging radar systems group.

Research interest

Luke's current research interests include SAR image formation, adaptive filtering and applications of MTI to SAR. His PhD focused on the problem of combining conventional adaptive beamforming with SAR image formation and is still an ongoing area of interest. However, due to the lack of multichannel data, recent work has focused on characterizing the maritime environment using the DSTO's multi-pol antenna with the goal of simulating it and testing MTI algorithms in a realistic way.

Summary

Interference suppression with multichannel SAR

One of the biggest external problems with SAR image formation comes from RF interference. At lower frequencies, these can be from a number of sources such as radio broadcasts, analogue or digital TV and any other strong RF radiator. While these are all unintentional sources of interference, there may also be intentional SAR jamming by a ground or airborne platform.

A broadband jammer present in the mainbeam of a SAR can potentially destroy a large region of the SAR image. In addition to this, multipath reflections from the ground, known as hot-clutter or terrain scattered interference will add a non-stationary interference component to the image. The goal of interference suppression for SAR is to successfully suppress these interferences while not significantly affecting the image quality by blurring, reducing the resolution or raising the sidelobe level.

One of the most popular methods of suppressing interference is Space Time Adaptive Processing (STAP). The application of STAP to Synthetic Aperture Radar (SAR) is a relatively new field and is often used to detect moving targets. Multiple channels can also be used to accurately measure height, improve ambiguities in the cross-range, and reject undesired interferences. STAP comprises both spatial and temporal components where the spatial information comes from the use of multiple receive antennas on the airborne platform and the temporal information comes from the use of multiple pulses and/or fast-time samples within a pulse.

This talk will introduce STAP for airborne radar, and show how it can be applied to the problem of interference suppression in SAR. Using the scenario of an intentional airborne jammer, the performance of a number of fast-time STAP algorithms will demonstrate how hot-clutter can be suppressed while maintaining a good final SAR image.