11.12 SPECTRAL POLARIMETRIC FILTERS DESIGN FOR BROAD-BAND WEATHER CLUTTER MITIGATION

J.YIN[1], C.UNAL[1], H.RUSSCHENBERG[1]

[1] Delft University of Technology, the Netherlands
j.yin@tudelft.nl

In this work, spectral polarimetric filters (SPFs) are put forward to mitigate wind turbine clutter (WTC) and radio frequency interference (RFI) which are severe broad-band clutter for weather radar, deteriorating its performance significantly. The SPFs contain the moving double spectral linear depolarization ratio (MDsLDR) filter and the object-orientated spectral polarimetric (OBSpol) filter, which have been proposed to mitigate narrow-band clutter (i.e., ground clutter and moving artifacts) for full-polarimetric radar and dual-polarization radar, respectively. These filters are extended to remove the broad-band clutter (i.e., WTC and RFI). Based on the spectral polarimetric feature and range-Doppler continuity of precipitation and clutter, the SPFs are implemented in the range-Doppler spectrogram to generate one filtering mask to keep the precipitation and remove the clutter. Data collected by a polarimetric Doppler weather radar known as the IRCTR Drizzle Radar (IDRA) are used to validate the performance of the proposed algorithms. Mounted on the top of a 213 m tower in Cabauw Experimental Site for Atmospheric Research, the Netherlands, the X-band research radar is still affected by wind turbines which are 120 m in height and 3400 m far away. Additionally, the simulated RFI which is becoming a growing concern on weather radar is added to the raw PPI as another form of broad-band clutter. Different case studies demonstrate the good performance of the filters in wind turbine and radio frequency signal suppression. In addition, SPFs are proved to be effective with different Doppler velocity resolutions. Moreover, these techniques can be applied in real-time due to their low computation complexity.