Abstract

Complex wavelet Analysis have been carried out on backscattered signals of Mesosphere Stratosphere Troposphere (MST) radar, located at Gadanki (13. 50N, 79. 20E). The echoes received from MST Radar are weak and buried in noise which leads to decrease in signal to Noise Ratio (SNR). Complex wavelet Transforms such as Analytic Wavelet Transform (AWT) and Dual Tree Complex Wavelet Transform (DTCWT) are implemented and are used as denoising algorithms in order to have good improvement in SNR of radar returns even under severe weather conditions. The properties of shift variance associated with good directional selectivity, when compared to discrete wavelet Transform (DWT) forces Complex Wavelet Transforms to be used in the fields of Image Processing and Atmospheric Radar Signal Processing. In addition, DTCWT has Perfect Reconstruction and computational efficiency. Complex wavelet Analysis has been performed on the backscattered signals received in two modes. Results show a good improvement in SNR on application of AWT and DTCWT, when compared to real DWT. The height profiles of SNR for DTCWT are even far better than AWT.
Atmospheric Radar Signal Processing using Complex Wavelet Transforms


Index Terms

Computer Science Signal Processing

Keywords

MST Radar Backscattered signal Analytic Wavelet Transform Dual Tree Complex Wavelet Transform
Shift invariance

Directional Selectivity.