



A TOTAL QUALITY ASSESSMENT SOLUTION FOR SYNTHETIC APERTURE RADAR NLFM WAVEFORM GENERATION AND EVALUATION IN A COMPLEX RANDOM MEDIA

Iman Heidarpour Shahrezaei, Morteza Kazerooni, Mohsen Fallah

Electrical and Electronic Engineering Department (EEED)

Malek Ashtar University of Technology (MUT), P.O.B:115/83145

Lavizan, Tehran, Iran

Emails: Heidarpour@mut.ac.ir, Kazerooni@mut.ac.ir, Mohsen_fallah@mut.ac.ir

Submitted: Dec. 15, 2016

Accepted: Feb. 17, 2017

Published: Mar. 1, 2017

Abstract- A Design, simulation and optimal selection of non-linear frequency modulation waveforms (NLFM) based on correlated ambiguity function (AF) quality analysis for the purpose of Synthetic Aperture Radar (SAR) is done in this article. The selected optimum CNLFM waveform in contribution with other waveforms are applied directly into a SAR image formation algorithm (IFA) and their quality metrics in comparison to other waveforms are derived and analyzed in a complex random media (CRM). The total quality performance analysis includes both the qualitative AF diagrams and the objective image quality metrics assessments. The simulation results not only verify the robustness of the proposed NLFM waveforms as a suitable alternative for LFM waveform but also introduce NLFM as a proper method of modulation for SAR in CRM.

Index terms: Synthetic Aperture Radar (SAR), Non-Linear Frequency Modulation (NLFM), Ambiguity Function (AF), image formation algorithm (IFA), complex random media (CRM), quality assessment techniques.