

Simulation of SAR Image Using CHI-Square Distribution

Dr. Ali Abid Dawood AL-Zuky , Ayten Noori Husian

Sundus Hatem Majeed

**AL-Mustansiriya University- College of Science-
Physics Dept.**

Abstract

The intensity SAR Images are highly corrupted by speckle noise, this noise modeled as a multiplicative noise with mean equal to one, and obeys to Chi-Square distribution. So can be adopting, this distribution to generate speckle noise. Then simulate the SAR image by using multiplicative noise model (i.e multiply point to point incoherent image by generated random speckle noise). The results show that the simulated SAR image look alike a real SAR image. Also, the results give a high agreement between equivalent number of looks (NL) for the generated speckle file with NL in Chi-square distribution, where (2N represent the degree of freedom of the distribution). Hence the presented method is an efficient simulation tool for intensity SAR images.

Key-Words: SAR, Simulation, Chi-Square distribution, Speckle.

1. Introduction:

The utilization of Synthetic Aperture Radar (SAR) for target identification seems promising; because of choice of observation (scanning) dose not depend on date, time, and neither on atmospheric nor metrological conditions [1]. The shortcoming of SAR imaging systems is that, because the coherent nature of the radiated signal, produced images are highly corrupted with speckle noise which, intern, obstacle the automated interpretation by computer[1-3].

In recent years, interesting in digital SAR image simulation has been increased and directed toward the generation of realistic examples of hypothetical satellites systems. One of the major objectives of speckle noise that is examines the behavior of speckle noise, usually, that arising as result from implementing coherent imagery devices. However, the speckle effects, generally, treated as undesirable noise that degrades image quality as an information carrier for rough properties [3-7].

2. The Speckle Noise

The object that are illuminated by coherent electromagnetic wave (EMW) are readily produce peculiar granular appearance, this granularity phenomenon was first recognized by early workers in the laser filed [8]. Under illumination by coherent EMW, the reflected waves from these surfaces, that, consist contribution from many independent scatters in the illuminated area. The interference of these reflected coherent out of phase wavelets, results the speckle pattern. Speckle pattern, often consist of a multitude of bright and dark spots. The bright spots generated as results of highly constructive interference, while dark spots are due to highly destructive