Quality Measures for HRR Alignment based ISAR Imaging Algorithms

Vanessa Janse van Rensburg[1]; Amit Mishra[2]; Willie Nel[1]

[1]Radar and Electronic Warfare Systems, Defence, Peace, Safety and Security, Council for Scientific and Industrial Research, Pretoria, South Africa. Email: vjvrensburg@csir.co.za; wajnel@csir.co.za

[2]Remote Sensing Group, Department of Electrical Engineering, University of Cape Town, Cape Town, South Africa. Email: amit.india@gmail.com

Abstract

Some Inverse Synthetic Aperture Radar (ISAR) algorithms form the image in a two-step process of range alignment and phase conjugation. This paper discusses a comprehensive set of measures used to quantify the quality of range alignment, with the aim of 1) reviewing their benefits and shortcomings and 2) comparing their relative performance. Some quality measures may favour particular alignment techniques without adequately indicating improved alignment, so using multiple quality measures provide an added means of verifying the alignment quality achieved by any alignment technique. The sensitivity of the quality measures to slight misalignment of profiles and the effects of noise is also investigated.