

Extended targets modelling and block agnostic sparse reconstruction in through-the-wall radar imaging: A different perspective

Abdi T. Abdalla*, Mohammad T. Alkhodary** and Ali H. Muqaibel***

**University of Dar es Salaam, Electronics and Telecommunications Engineering Department, Dar es Salaam, Tanzania*

***École de Technologie Supérieure, Montréal, QC, Canada*

****King Fahd University of Petroleum and Minerals, Electrical Engineering Department, Dhahran, Saudi Arabia, 31261*

***Corresponding Author: mohammad.alkhodary.1@ens.etsmtl.ca*

ABSTRACT

A common target model in through-the-wall radar (TWRI) imaging literature obeys the point target (PT) assumption in which a target is hypothesized to occupy a single pixel. Unlike PTs, the received signal reflected from extended target (ET) is an integration of the scattered signals from various parts of the same target. For high resolution images, a generalized model is needed to encompass the ETs. In this paper, we suggest a different but realistic ET reconstruction approach based on agnostic block sparsity. The algorithm does not impose any assumption on the length, number, or the distribution of the blocks. Results based on MATLAB simulation and experimental data show the effectiveness of the proposed reconstruction approach. The applications of the suggested approach are found in civil, rescue, surveillance, and security enforcement sectors, where an accurate tracking of large targets behind walls is vital.