Imaging Multiple Moving Targets

From Distributed Sensors

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Abstract

This talk shows how to develop a linearized imaging theory that combines the spatial, temporal, and spectral aspects of scattered waves. We consider the case of fixed sensors and a general distribution of objects, each undergoing linear motion; thus the theory deals with imaging distributions in phase space.

We derive a model for the data that is appropriate for any combination of waveforms transmitted from any positions and received at arbitrary locations.

We use a phase-space imaging formula that can be interpreted in terms of filtered backprojection or matched filtering. For this imaging approach, we derive the corresponding point-spread function, which turns out to be related to the familiar radar ambiguity function.

Biography

Margaret Cheney has a Ph.D. in Mathematics from Indiana University, where her advisor was Roger G. Newton. Afterward she was a postdoc at Stanford University under J.B. Keller. After 3 years at Duke University she moved to Rensselaer Polytechnic Institute, where she is Professor of Mathematics. She has received a number of awards, including the Office of Naval Research Young Investigator Award, a National Science Foundation Faculty Award for Women in Science and Engineering, and the Lise Meitner Visiting Professorship at Lund Institute of Technology (Sweden). She serves on a number of editorial boards, and is a Fellow of the Institute of Physics and a Fellow of the Society of Industrial and Applied Mathematics.