

Semyon Tsynkov
North Carolina State University

Synthetic aperture imaging through a turbulent ionosphere

We will discuss an intriguing recent finding that pertains to the imaging of the surface of the Earth by spaceborne synthetic aperture radars (SAR). SAR is a coherent imaging technology that uses microwaves for reconstructing ground reflectivity as a function of spatial coordinates.

Ionospheric turbulence brings an additional dimension into the SAR analysis; this new dimension accounts for randomness. The overall error now has two components, deterministic and stochastic. They are fundamentally different. The stochastic component becomes larger as the synthetic aperture gets smaller compared to the outer scale of turbulence. Then, why in the ultimate case of very short apertures it appears that the stochastic error can be completely disregarded?

We will outline an approach to answering this question and identify the outstanding issues that require future attention.