

1163-86-493

Mikhail Gilman and **Semyon Tsynkov*** (tsynkov@math.ncsu.edu), Department of Mathematics, North Carolina State University, Box 8205, Raleigh, NC 27695. *Synthetic Aperture Radar Imaging through a Turbulent Ionosphere.*

Earth's ionosphere causes distortions of spaceborne synthetic aperture radar (SAR) images. They depend on the state of the ionosphere and parameters of the sensor. In particular, turbulent ionosphere presents a major challenge because image distortions acquire a random component. The performance in azimuth of low-frequency systems (P-band) can be particularly vulnerable to random fluctuations of the propagation phase.

We consider the size of the synthetic array relative to the scale of ionospheric turbulence and characterize image distortions in terms of blurring and azimuthal shift. Specifically, we show that in the case of large-scale turbulence, a high level of eikonal fluctuations can coexist with the low degree of image distortions, and that blurring becomes significant at much higher levels of fluctuations than the shift. In the small-scale case, a low level of eikonal fluctuations is a precondition for imaging, while the magnitude of distortions depends on the ratio between the eikonal correlation radius and the length of the synthetic aperture.

We also discuss the potential mitigation strategies based on autofocus. (Received September 08, 2020)