UNFOLDING OF RADIO OCCULTATION MULTIPATH BEHAVIOR USING PHASE MODELS

K. B. Lauritsen*(1) and M. S. Lohmann (1)

(1) Danish Meteorological Institute (DMI), Copenhagen, Denmark

We have analyzed radio occultation simulations containing various types of multipath behavior. The simulations are performed for both global atmospheric fields and for simple models containing strong refractivity gradients which give rise to multipath behavior.
In the case where the medium and the satellite orbits are spherically symmetric the multipath behavior can be unfolded by a Fourier transform of the measured signal. Here, the derivative of the transformed phase at a given frequency is equal to the time where that frequency appears. However, small deviations from circular orbits implies that the multipath behavior cannot be completely unfolded, i.e., a given frequency occurs at more than one time instant.
In order to resolve the multipath behavior for generic satellite orbits, we employ the idea of modifying the measured signal by a model before carrying out a Fourier transform. For certain models, which depend on the measured phase of the simulated signal, we find that multipath behavior can be successfully unfolded. Even very strong multipath behavior, leading to critical refraction, can in some cases also be handled. We also discuss what types of multipath that our approach cannot unfold completely. The combined effect of applying a model and a Fourier transform can be viewed as a specific type of a canonical transform.