ERROR ESTIMATE OF BENDING ANGLES IN THE PRESENCE OF STRONG HORIZONTAL GRADIENTS

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Canonical Transform (CT) and Full-Spectrum Inversion (FSI) depend on the multipath unfolding by projecting the ray manifold to the axis of the effective impact parameter. For a spherically-symmetric atmosphere the effective impact parameter equals the ray leveling distance, both at the transmitter and the receiver. In the presense of horizontal gradients the leveling distances at the transmitter and receiver will be different, the difference being a functional of the horizontal gradient of the refractivity along the ray. The effective impact parameter is thus a function of the leveling distances. As a result, in the presense of strong horizontal gradients the projection of the ray manifold to the effective impact parameter axis may become non-unique, thus impeding a complete multipath unfolding. In this situation it is, however, possible to estimate the CT/FSI bending angle error using the radio holographic technique. We present examples of simulated radio occultation events obtained with an analytical model of an atmospheric front and with global atmospheric gridded fields from European Centre for Medium-Range Weather Forecasts (ECMWF) re-analyses. We show how the radio holographic quality control and error estimation techniques work in this situation and how this information complements the CT/FSI bending angle profile estimates.