Constrained simultaneous algebraic reconstruction technique (CSART) a new and simple algorithm for ionospheric tomography

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We present a simple and fast method for tomography applications of smooth fields, i.e without discontinuities. Since our approach works without matrix algebra it can be implemented in low level programming language, what speeds up tomography applications significantly. Compared with the traditional simultaneous algebraic reconstruction technique, our approach enables both, estimation of instrumental offsets and consideration of physical principles (expressed in the form of finite differences). By an example, using a 2D artificial data set, it is shown how the method can be applied for radio tomography of the ionosphere, using GPS ground receivers and low Earth orbiting (LEO) satellite occultation measurements. Convergence speed of the method is discussed and the ability of the algorithm for the estimation of instrumental offsets is demonstrated.