Application of 2D Bisection Method for the Inverse Winkel Tripel Projection

Željka Tutek, Miljenko Lapaine
Faculty of Geodesy, University of Zagreb, Kačićeva 26, 10000 Zagreb, Croatia
zeljkat@geof.hr, mlapaine@geof.hr

Abstract: A common problem in cartography is to determine the geographic coordinates from the plane coordinates. This leads to solving system of equations. For some map projections nonlinearity and complexity of the equations does not allow analytical but only numerical solution of the inverse transformation. For the inverse Winkel Tripel projection the algorithm with exact Newton's method is well known. Although, Fortran program for it is available, the implementation of the method is a nontrivial task. The bisection method is well known for finding the root of one equation, but its generalizations to a system of equations are not as known. For the inverse Winkel Tripel projection we will propose the algorithm with nested bisection method which is very simple and always converges. A priori stopping criterion ensures the achievement of a certain desired accuracy.

Keywords: inverse Winkel Tripel projection, system of nonlinear equations, bisection method