The use of Nelder-Mead simplex method for fitting the curves during for railway track realignment

MSc Eng Marta Skała-Szymańska

ABSTRACT

The main goal of the dissertation is develop the mathematical foundations of a new method of fitting specific sets of curves into a set of points, as well as to formulate of a mathematical model of mentioned method and to develop a computational algorithm leading to the correct solution.

The research hypothesis put forward is: use of the Nelder-Mead simplex method, as an alternative approach to the methods used so far can significantly increase the efficiency of the process of fitting curves into a set of measured points.

As part of the dissertation, an optimization task was developed, its mathematical model was analyzed, and a calculation process was developed leading to an optimal solution. The procedure of fitting curves into a set of points was developed in the MATLAB software.

The goal of this thesis was achieved. New method of fitting rectilinear sections, a circular arc and a circular arc with asymmetric clothoids into a set of points was created.

Key words: curves fitting, railway track realignment, optimization