Volume Calculation Through Using Digital Elevation Models Created by Different Interpolation Methods

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SUMMARY

The digital elevation model is a model which defines the surface of land three-dimensional and has been created through the elevation data of the land. The digital elevation model has been widely used in the fields of application such as, preparation of road projects, excavation-filling-related volume calculations, land arrangement studies, etc. The volume calculations which is the subject of this study and have been used in a variety of engineering services, have often been used in the reserve determination of mine sites, in the determination of splitting and filling soil removal works of the sites such as, road, airport, tunnels etc. Since the amount of the calculated volume burdened financially great expenses to employer, the calculations must be made in a precise manner. The aim of this study is to make and compare the volume calculations with different grid ranges and different interpolation methods. In this study, grid ranges were selected as 50 m, 100 m, 150 m and 200 m. The interpolation methods used are Inverse Distance to a Power (k=1 and k=2), Point Kriging, Minimum Curvature, Modified Shepard's Method, Natural Neighbor, Nearest Neighbor, Polynomial Regression (simple planar surface), Multiquadratic Radial Basis Function, Triangulation with Linear Interpolation. The volume calculation methods used are Trapezoidal rule, Simpson's rule, , Simpson's 3/8 rule. The digital elevation models were prepared in the "Surfer 8" program. The surface modelling of the land is made through the chosen different interpolation methods and the grid extended files of these resulting surfaces were created. Afterwards, the volumes of these surfaces with reference to the selected reference surface, $Z = 0$, were determined with different methods and were compared.

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