GEOINFORMATIC MODELING IN THE PROCESS OF MODEL NETWORK CREATION AND ITS APPLICATIONS

Blanka Malá, Jan Pacina

Technická univerzita v Liberci

Abstract

Spatial model networks are used in the process of modeling of decomposed time stable phenomenon (i.e. water flow, transport inside the rock layers). This type of modeling is applied by the finite element method and by tools based on this method. Application of these tools requires processing of real data from the modeled area – here we may find the big advantage of using the GIS and the geoinformatic modeling. The model network is defined by a finite number of two and three-dimensional elements covering the area in accordance with specified criteria and in given spatial resolution. Modeled area is required to be discretized, then is created its geometrical model and in the next step the model network. The model network is in fact a purpose model of defined area. This means that from geoinformatic modeling point of view we may consider the pre-processing of geographial data for further mathematic modeling to be a creation of purpouse-built models. The possibility of making derived purpose-built models is conditioned to the prime creation of geoinformation system invariant to a set of applications used by the data organized in the GIS. GIS is further used as data base for filling the model networks with data. For the flow and transport models is required to define the edge conditions – they are the geographical and physical properties of the object model and are assigned to the model-network elements based on attribute data saved in the GIS. Although each of mathematic models requires a different model network and always are modeled different area characteristics, there was created a general method for deriving the purpose model networks, where the result is a model with pre-defined data structure. Within the data pre-processing are applied GIS analytical functions and generalization methods. A very big benefit is the possibility of visualizing the database at any time and by this keep the control over the derived model connectivity to the modeled reality. The creation of geometric models following by the model networks is done in several steps. We start with defining the requirements for the resulting networks, creating the GIS corresponding to the set of desired application, followed by the main processing of the geometrical model and model network with the last step – loading the data. For each step of this method is prepared a very precise methodic covering the GIS applications for data pre-processing – using the GIS GRASS. For process where the model is transformed from the GIS environment into geometric model in GMSH (finite networks generator) are being developed applications to automate all required steps. Models created along this methodology are relevant for use in flow and transport modeling. This article shows the usage of model networks in application on landscape recultivation management – especially on hydric landscape recultivations (the former coal mine is turned into a lake). During the modeling we have to consider a lot of factors and thus may be created a very large networks containing various types of data

Autor nedodal plný text příspěvku.

Author did not supply full text of the paper/poster