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Modelling of geospatial development of tourism infrastructure using fractal and artificial intelligence methods

This study is devoted to the development methods and mathematical simulation tools for solving the basic problems of the tourist industry, namely, as regards different territories: determining tourist attraction, tourist flow, modelling the spatial distribution of urbanisation processes on the example of tourist settlements, researching new conformities, analogies and prospects of using already developed models and methods.

Updating research consists in developing the concept of the prognosis of poorly controlled social processes such as the growth of cities and settlements related to the active development of green tourism, the creation of concomitant infrastructure, dividing people into categories based on general interests, work, rest and recreation, and others based on fractal growth methods well known in solid physics in combination with the fuzzy logic theory. It was on the basis of fuzzy logic that the method for determining territory recreational attractiveness was developed. The new spatial structure simulation methods of polycentric tourist towns are developed on the basis of already known mathematical fractals, namely: recursion affine fractals – trees of Pythagoras, three-dimensional affine reliefs and Brownian stochastic surfaces. The new models of development dynamics for polycentric cities are developed on the basis of “casual rain” and continuous diffusion-limited aggregation models. Fluctuations in the growth of physical fractals are investigated, and their presence in authentic urbanised systems is confirmed. An expert system integration algorithm of the designed methods was proposed. Practical use of the expert system creates the possibility to make decisions in the tourism sphere.

Basic conclusions found practical application for the planning of regional development strategies, for decision-making by tourist-recreation complex administrators, in research themes, and methodical developments are used in the educational process.