

Mateusz ZAREBA^{1,*}, Tomasz DANEK¹

* Corresponding author: mattzareba@gmail.com

¹AGH University of Science and Technology, Department of Geoinformatics and Applied Computer Science, Poland

Nonlinear anisotropic diffusion techniques for seismic signal enhancing - Carpathian Foredeep study

Abstract

The use of nonlinear anisotropic diffusion algorithm for advanced seismic signal processing in the complicated geological region of Carpathian Foredeep was examined. The presented technique allows for an improvement of seismic data quality and for more accurate interpretation by the recovery of a significant amount of structural information in the form of a correlating seismic reflections and by preserving true DHI indicators. It is also a tool that allows searching for more subtle geological structures. Anisotropic diffusion is an iterative image processing algorithm that removes noise by modifying the data by solving partial differential equations. Moreover, it can reduce image noise without blurring the edges between regions of different chrominance or brightness. This filter preserves edges, lines, or other features relevant to the seismic structural and stratigraphic interpretation of reservoir rocks. The algorithm also enables noise reduction without removing significant information from a seismic section even for high dips values. For a better estimation of anisotropic diffusion structure tensor, the parameterization is done using the depth field and the calculations in the two-way travel time field. The presented research shows the results of using an anisotropic diffusion algorithm for post-stack and migration processing of seismic 3D data collected in Carpathian reservoir rocks of southern Poland.