MODELLING OF SEQUENCE OF SUBSURFACE RELIEFS OF MULTILAYER GEOLOGICAL STRUCTURES

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Abstract

Traditional approach of modelling of two boundary surfaces of a geological horizon is processed through interpolation of each surface separately as a sequential estimation process. Unfortunately, this approach often leads to the incorrect results and creates geologically unreliable models of the subsurface structures. The uncertainty of such models increases with depth of geological layers and in cases of deviated wells and fault presence. The main problem is to keep consistency between geological layers that constitute all formation or a chronostratigraphic unit. It results in crossing of the modelled surfaces each other because surfaces are modelled independently and relations between surfaces are not considered. Difference between such modelled two successive surfaces gives negative thickness what is nonsense because thickness is strictly positive variable. That means that even in case in which correlation between two successive layers, in mathematical sense, doesn't exist there is inherent correlation, in geological sense, which must be taken into account in any realistic geological modelling. Multivariate approach is an alternative to the sequential one. Multivariate methods consider modelling of geological layers in a simultaneous way and they are based on modelling of layer proportions or cumulative thicknesses of the formation. Final multivariate geological models respect the spatial correlation between layer and they reflect in a more effective way the geological structures what is fundamental for volumetric calculation of the reservoirs.

Keywords: geological layers, inherent correlation, proportional thicknesses, cumulated thicknesses

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