Object-Based Stochastic Modeling of Turbiditic Channels Reservoirs

[1]SANTOS, M.B., [1]LANZARINI, W.L. and [2]TAVARES, G. [1]PETROBRAS, Rio de Janeiro, Brazil; [2]PUC, Rio de Janeiro, Brazil.

Geologic modeling of reservoir genetic units is worldwide recognized as an important step for a successful reservoir development plan. It also leads to reliable reservoir performance predictions and to adequate economic analyses of petroleum fields. In this work, turbidite channel reservoirs of a petroleum field are modeled using object-oriented method.

The geometric shape chosen to represent the main reservoir bodies is a sinuous object with semi-ellipsoidal cross-section. The object parameters are: width, thickness, length, sinuosity and direction. The modeled object parameters are based on probability distribution and correlation functions obtained from measurements of sandstone bodies on analog data from the Almada basin outcrops and the Lagoa Parda field.

The object-based method is carried on with an algorithm that describes the stochastic processing by using geometric structural relations among bounding surfaces, corners, and axes of the simulated object. The enveloping surface is identified by its parametric and implicit equations and by the interior point calculations, which guarantee the various well data simultaneous conditioning.

The applied data structure and topological operators enable the representation of lateral and vertical stacking channels and the resulting 3-D reservoir architecture. The volume calculation from different scenarios allows uncertainty evaluation and its implication on the economics of the development and production phases of a petroleum field.