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Alain Laval[1], Gerard Auxiette[2], Brigite Doligez[3], Efren Solorzano[4], Carlos Uroza[4] (1) Beicip-Franlab, Rueil Malmaison, France (2) Beicip-Franlab, (3) IFP, Rueil, France (4) PDVSA, Puerto la Cruz, Venezuela

A New Efficiency 3D Stochastic Modeling Method: El Furrial Giant Oil Field Venezuela

This paper presents a new method used to build stochastic model of El Furrial giant oil field in Venezuela containing originally about 7 billions STOIIP. The field is approximately 13 km along strike and 7 km wide. It produces from the two reservoirs Naricual and Los Jabillos Formations, which gross thickness is about 2500 ft. The Furrial field is set in highly structural complex reservoir located in a thrust and fold belt formed from the oblique converge between the Caribbean and South American plates. A realistic 3D model has been built, respecting this complex structural setting, the petrophysical data and the high diversity of sedimentological environments which compose the reservoir. An accurate structural framework was built, integrating 12 complex surfaces and more than 60 main faults. The reservoir interval was divided in 11 stratigraphic units separated by main flooding surfaces which have been selected as reference surfaces. A new Pluri-gaussian algorithm was used to perform simulations of the complex organisation of rock types. The two combined variograms allow to select two distinct anisotropy directions coupled with different ranges, which can be linked with two distinct heterogeneity scales. Depositional facies and rock types were then combined to obtain a representative stratigraphic and petrophysic model. The resulting very high resolution grid (about 350 million of cells), has been successfully upscaled in terms of rock types and porosity in order to get a coarse model (about 900 thousand cells, 70 secondary faults) to run dynamic simulations, with a good confidence in the relationship between the sedimentologic and petrophysic models.