

PERMEABILITY ESTIMATION USING ARTIFICIAL NEURAL NETWORKS IN A BRAZILIAN OFFSHORE RESERVOIR.

PINHEIRO, J.E.F. and LIRA, J.E.M., Petrobras Research Center, Rio de Janeiro, Brazil.

Permeability is fundamental to characterization of petroleum reservoir, although there is no well log for permeability. Many empirical studies on predicting permeability had limited success because it is considered a complex function of several interrelated factors such as rock grain size, grain shape, grain packing, degree of consolidation and cementation. In such cases, when it is hard to determine a priori mathematical model, statistical methods are not recommended. Instead, Artificial Neural Networks can be used. ANN is a computer model that attempts to mimic some workings of the human brain. ANN implicitly defines its own, usually very complicated, predictive function as a result of the training process. This study was carried on some wells of a Brazilian offshore reservoir. The sonic, gamma ray, ρ_p , density and porosity logs of well A, located in the center of the field, were used as input for the network training. The training output was the permeability profile in cores obtained from the probe permeametry. Wells which reservoirs are not fully cored is a common place. The function was tested in confirmation wells. As the network was tested and checked it could be applied to noncored intervals of the wells and also to others noncored wells of the area. Results showed that this technique for permeability prediction from well logs using neural network to our field data was a success despite the loss of some high frequency. The areal extent of its applicability is a very difficult question to answer