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Systematic assessing over-pressure characterization by using lateral transfer reference case in basin modeling

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Developing a deep-water basin raises many issues and challenges; one of the most significant and necessary issues is overpressure prediction. Basin modelling to construct full scale models is an effective way to find out overpressure distribution in many conditions. However, it is difficult to obtain data about highly heterogeneous complex structures in deep-water basins. The data collection is difficult and costly. Therefore, predicting overpressure formation as accurate as possible with minimal data and costs become interesting and important in both economic and time aspects. Tilted sandy aquifers enclosed in muddy sediments (fluid lateral transfer) are a good reference case which is not uncommon in deep-water basins worldwide and has been well studied. This paper shows that, by applying basin modelling and statistical response surface methodology, not only is a parameterized prediction possible but also the uncertainty of the parameters can be taken into consideration at the same time. Summarized and obtained influential factors on overpressure and its sensitivity to their influence: over-burden mud sedimentation rate, clay content, aquifer depth and aquifer relief, which are proportional to overpressure at the tilted sandy aquifers. Aquifer bending was found to have an inverse influence on overpressure. And found that aquifer thickness, basin scale and basin depth do not have any obvious interaction with overpressure in the system. Obtained relationship between overpressure and the influence factors by using response surface methodology in 364 models, got 99% models relative error were less than 30%. The practicability which has 5.3% relative error was proved by basin data of Central North Sea in last section. The result forms the basis for follow-on research that can seek to further generalize the approach to a wider set of systems and their associated descriptive parameters.

Biography

Jiangchen Han has completed his PhD at the age of 28 years from Heriot-Watt University in United Kingdom. He is a senior engineer in Petro China Research Institute of Petroleum Exploration & Development and has so much experience on geology basin modeling creating and practical technical support.

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