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Field Case : Validation of the Girassol Geological Model through Numerical Well Test Simulations

Dynamic data constitute a key information for the validation of reservoir geomodels in mature fields. Before field development , the dynamic information is usually limited to a few well tests conducted in the appraisal wells. Well test interpretations are commonly used, together with cores and logs, as a prior information to populate reservoir models with Petrophysics. However, because of scale problems, fine-grid geomodels cannot fully respect average permeability and reservoir shape derived from interpretation of pressure measurements. This paper shows, through a case study, how a geomodel can be constrained to well test data before production start-up. This required to match simulations of monophasic flows of 13 DST and 2 interference tests on actual data, in order to reconcile pressure data and the geomodel in the area explored by the tests. Girassol is a major deep water development in the offshore Angola. The field development concerns high permeability sands in turbiditic channels. After the coarse reservoir model has been built, local grid refinements were constructed around the wells, in order to simulate pressure transients. The high level of reservoir permeability leads to well test investigation radius about 1000m. Consequently, the match of pressure transients enabled to constrain the geomodel in a significant part of the field. 11 DST out of 13 have been successfully matched with a modification of horizontal or vertical permeability in the range of the geological uncertainty. The matching of the interference tests required more iterative work with geology, as they involve more complex communication paths between geological sequences. Geological understanding of reservoir heterogeneity was significantly improved and detailed by such a full integration of well test data in the geomodel. Some of the shale intervals were proved to be more extended than expected from the geological concept. On the other hand, the importance of major faults was highlighted by the needs of connectivity between sequences.

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