

ABSTRACT

ASSISTED HISTORY MATCHING WITH PARTICLE SWARM OPTIMIZATION IN THE "SHM" FIELD USING T-NAVIGATOR

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"SHM" field is an oil field that has been developed since October 1957 to June 2017. The history matching process in the "SHM" Field simulation will be carried out using assisted history matching. Assisted history matching is more efficient and easier than manual history matching. Assisted history matching can help control parameters and update parameters simultaneously. Assisted history matching will be carried out using the Plackett Burman method (1946) and particle swarm optimization (1995). The assisted history matching process combines parameterization and realization in order to obtain a matching cumulative field production.

The assisted history matching process begins with making control parameters through a workflow, then making an experimental design with Plackett Burman (1946), setting the objective function according to the permitted tolerance limits, analyzing parameters and variant realization for optimization. The final stage is to optimize the objective function using the parameters and realizations that have been selected to obtain a feasible cumulative field production simulation model.

35 parameters will be sensitive for the experimental design with Plackett Burman. The results of this experimental design provide information about parameter values that produce smaller misfits. The 5 best variants were selected from the experimental design and 33 parameters were selected which would proceed to the optimization process. Optimization was carried out with particle swarm optimization of 215 variants and obtained misfits that matched the tolerance limits, as result cumulative misfit of oil production is 1%, misfit of cumulative water production is 1.74%, misfit of cumulative liquid production is 1.16% and gas misfit is 5.56% which this result is satisfying.

Keywords: Plackett Burman, Realization, Parameterization, Objective function, Particle swarm optimization