DRAG REDUCTION MATHEMATICAL MODEL DEVELOPMENT WITH DRAG DEGRADATION USING TRIAL TESTS

Background
Polymer degradation is a major factor limiting their use for oil and oil products transportation. Just a few researches of drag reducing agent (DRA) additives’ degradation in industrial environment were held so far. Therefore it is highly relevant to conduct and proceed the trial tests of the DRA degradation in order to derive the mathematical model.

Aims and Objectives
Processing of the results of the trial tests to determine the kinetic parameters of the DRA degradation. Development of a mathematical model of the flow in the pipeline, taking into account the degradation of DRA and using the results of the trial tests to determine the model parameters of the degradation kinetics.

Methods
Determination of the drag reduction effectiveness of the DRA along the pipeline under stationary conditions by monitoring the friction pressure loss under the non-stationary sequential filling of various concentrations of DRA. Determination of kinetic parameters of the DRA degradation from the best quantitative agreement between calculated values and experimental data.

Results
The drag reduction efficiency of DRA along the length of the pipeline was experimentally determined by monitoring the pressure loss for friction during the trial tests. The mathematical model were derived and identified on the basis of experimental values of the drag reduction efficiency of DRA of different concentrations.

Conclusion
It has been proved, that the drag reduction effectiveness of DRA could be determined by monitoring the friction pressure loss with sequential filling of the pipeline with DRA.

Results
It has been shown that there is a critical molecular weight of the polymer when degradation stops. To clarify the kinetics of DRA degradation, depending on the regime, geometrical and physicochemical parameters it is necessary to carry out the adequate (i.e. accurate) trial tests, including the pressure recording by sensors at intermediate points and at the same time by monitoring the friction pressure loss during the sequential addition of DRA of different concentrations.

Key words: drag reducing additives, trial tests, monitoring the friction pressure loss, drag reduction efficiency, mathematical model, degradation, kinetic parameters, estimation based on trial tests
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