

Summary of PhD dissertation in English:

The aim of research was to analyze influence of annuli geometry and casing column motion on the cementation outcome. It was shown, that optimization of this process is critical from the environmental perspective, as well as the world economy. In this purpose, an innovative laboratory rig has been created to analyze fluids displacement in the annular space. A number of experiments were conducted with alteration of parameters such as:

- degree of eccentricity of the cylindrical surfaces,
- slope of the annular space,
- rheology of the used fluids,
- rotational speed of the inner column,
- reciprocating movement of the inner column,
- presence of an obstacles which simulate defined borehole events.

It is important that in the open literature, the influence of the last two factors in laboratory conditions, is being analyzed for the first time. What is more, significant negative impact of the geometry changes has been confirmed by the analysis of the survey results from commercial wells, as well as from created experimental wells of depth up to 99m. For visualization purpose of the processes occurring in the annular space, a range of CFD simulations has been performed, illustrating for example so called finger flow creation. The dissertation ends with recommendations for further studies and proposed scheme of optimized test rig.