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## SIMULATION OF MECHANOCHEMICAL ACTIVATION AND ACOUSTIC EFFECTS OF THE HYDROCARBON MIXTURE

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**Abstract.** The present research paper examines issues connected with the modeling of mechanochemical activation and acoustic effects on the hydrocarbon mixture. Modeling of mechanochemical activation and acoustic effects on the hydrocarbon mixture is carried out based on the three-dimensional Navie-Stokes equation considering equation of continuity and equitation of concentration for the components of hydrocarbon mixture in the rotary drum with the rotating disks. Mechanochemical activation and acoustic effects on the hydrocarbon mixture occurs due to special rotation of disks in the cylindrical domain with equal speed but in different directions. An experiment confirming integrated effect was carried out based on the special equipment developed during the present scientific research. Obtained results may encourage development of new technologies for production, transportation and storage of oil and oil products, and may be also beneficial for crude hydrocarbons processing plants.

**Keywords.** hydrocarbon mixture, integrated effects, mechanochemical activation effects, acoustic effects, Navier-Stokes equations, hydrodynamic activator.

### 1 Introduction

Implementation of the “State Program on Forced Industrial-Innovative Development of Kazakhstan for 2014-2019” and “100 specific steps towards entry into the top thirty countries worldwide” [1, 2] reveled necessity in accumulation of local scientific developments, which results may be used for creation of new technologies for production of light and heavy fractions of oils. Such scientific researches include low-energy effects on the hydrocarbon mixture. It is worth mentioning that such effects allow reconstruction of the mother substance without significant external energy costs (and sometimes by using internal reserves of the substance). The specified effects have been studied throughout last fifteen years and include – electromagnetic, electric, magnetic, acoustic and vibrational fields, as well as mechanochemical activation and thermomechanical effects [3-5]. Energy technologies (such as acoustic, vibrational, magnetic, etc) relate to the most perspective developments, especially considering their efficient performance, effectiveness and affordability. These researches have been included into scientific papers of many famous researchers [6-9].

The specified effects on oil are finding ever-widening applications in oil industry. The use of the specified techniques allows achieving significant levels of oil associates structure's destruction within the short period of time and maintaining these levels in the course of time. Transformation of the hydrocarbon mixture into active condition enables complete realization of potentials of such hydrocarbon mixture, increasing the product yield and ensuring obtainment of required physical and chemical parameters.

Among factors limiting widespread application of effective technological processes connected with effects on the hydrocarbon mixture it is worth mentioning absence of the required and state-of-the art equipment in real working environment.

This problem may be solved due to creation of necessary technological equipment based on the mathematical modelling, considering physical parameters of the process and de-