

## ABSTRACT

The paper presents the results of theoretical and experimental research on a hydraulic clutch of its own design with a magnetorheological working fluid and a rotating magnetic field located on the clutch circumference. The principle of this clutch is to use a rotating magnetic field created by an alternating current electromagnet to set the magnetorheological fluid in motion. In the tests of the hydraulic clutch with a rotating magnetic field, commercial fluid AL 458 and magnetorheological fluids produced on their own, consisting of solid iron particles of various diameters mixed with silicone oil OL.111 or lubricant LT-43, were used as working fluids. The rheological properties of magnetorheological fluids were assessed on the basis of tests carried out with a Brookfield DV2T rheometer equipped with an adapter for generating a magnetic field of its own design. Based on theoretical considerations, the limit pressure value in the clutch working gap was also determined, at which solid particles can separate from the liquid and join together, creating agglomerates that adversely affect the clutch performance.

The characteristics of the hydraulic clutch with magnetorheological working fluid and a rotating magnetic field located on the circumference of the clutch were tested on a specially built test stand. As a result of the research, it was found that the torque transmitted by the clutch is the greater, the higher the rotational speed of the magnetic field and the lower the rotational speed of the vessel in which the working fluid is placed, and that the greatest torque occurs for the working fluid with the highest iron content or the largest particles.

Based on the analysis of the structure and characteristics of the clutch in which the magnetic field is used, it has been shown that the design of the developed clutch is similar to that of an induction clutch, and its characteristics correspond to the characteristics of the eddy current clutch. A clutch with a magnetorheological fluid and a rotating magnetic field can find application, like an eddy current clutch, in stationary drives with motors with a constant rotational speed.

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