Analysis of Operational Characteristics of SRM in Emergency Modes of the Converter Unit

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***Abstract*— Abstract — The paper analyzes the issues of maintaining the operability of a switched reluctance motor (SRM) in various emergency situations. The researches were carried out using simulation modeling in the Matlab environment, the developed model was used for both normal and emergency operation modes. A series of dynamic tests of the motor torque has been carried out, and the values of the electromagnetic torque pulsation coefficient have been calculated. The possibility of maintaining the operability of SRM in the event of various emergency situations in the phases of the motor has been proved. The static mechanical characteristics of the motor are built and the calculation of the droop of the mechanical characteristics for possible emergency modes is performed.**

Key words – switched reluctance motor, emergency modes, fault tolerance, modeling.

I. INTRODUCTION Switched reluctance motors (SRMs) have recently become widely used as a traction drive for various vehicles: technological vehicles, cars, locomotives, aircraft and underwater vehicles. This development is due to their significant advantages: simplicity and manufacturability of the design, high reliability and fault tolerance, high weight and size and energy performance, the ability to work in difficult conditions, a wide range of speed control, flexibility and efficiency in control, etc. An essential feature of the switched reluctance motor, that distinguishes it from other types of machines, is the possibility of its operation in the event of failure of one or even more phases. In the case of the use of SRMs in autonomous vehicles, the reliability factor of the electric drive often comes to the fore, that is especially important for aircraft, as it determines the level of safety of the device itself. For a manned aircraft, the reliability of the drive is extremely important, as it determines the necessary level of security for the crew and passengers.

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