Paper presentation

SYNCHRONOUS ELECTRICAL MICROMACHINES IN CONSTRUCTION
"DOUBLE EXCITATED" DEVELOPED AT INCIDE ICPE-CA

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Abstract: The paper presents the way in which an electrical generator was developed in an original version, with double excitation. It was mainly followed the manufacturing of an electrical power generator with maximum power that can be achieved, correlated with a smaller mass, for a given volume, used for specific applications in the field of UAV (Unmanned Aerial Vehicle). The experimental model of the developed electrical machine is made from a joke composed of cylindrical ring shaped laminations on which toroidal coils are disposed. This model differs from classic electrical machines through that the stator has both sides of the active coils (which covers both the outer surface of the stator cylinder and its inner surface) both at the outer air gap, as well as the inner one, in the heteropolar magnetic field generated by the outer inductor and respectively the inner inductor, disposed on a double rotor, made with permanent magnets. The electromotive voltages produced in coils due to the interaction with inside permanent magnets as well as with external ones gather, thus increasing the specific power of electrical machine.
The paper presents a specific development of electrical machine with this construction, in a single phase synchronous variant, with excitation through permanent magnets, as a micro generator with applications in the aerospace field. In addition to the theoretical and computational elements, due to the unconventional constructive structure and the specific application requirements, references are made regarding the recommended materials and the manufacturing technology. Thus, for the reduction of mass, where there was no need for parts made of ferromagnetic materials, a modern synthetic insulating material was preferred (Ketron 1000 PEEK) with superior mechanical strength and relatively low specific weight compared to metals. Regarding the materials used for the yokes for closing the magnetic circuit at the level of the inductor and the inducer, at the initial experimental model these armatures were made from conventional ferromagnetic materials: for the inductor massive laminated iron OL37 (outer and inner rings that are equipped with permanent magnets), and for the induced Fe-Si laminations of 0.2 mm thickness (ring shape stack). For the optimized model, in the desire to minimize the cross sections of the armatures (smaller overall weight), but with the price of increased magnetic stresses, it was decided to use a modern ferromagnetic material, with superior magnetic characteristics, Supermendur (Hiperco 50), laminated massive part for inductor, and for the induced laminations of 0,2 mm thickness [8], [9], [11], [12].

Number of pages: 8;
Cited references: 12;
Number of figures: 9;
Number of tables: 0.