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High Torque Permanent Magnet Synchronous Machine for biomechanical applications

***Abstract**: This paper will present the results of a simulation study of a permanent magnet synchronous machine for use in biomechanical structures. Of particular note is the implementation of a magnetic gearbox in the machine.*

Keywords: electrical machines, biomechanical constructions, exoskeleton, humanoid robot, magnetic gearbox

High Torque Permanent Magnet Synchronous Machine construction

A permanent magnet synchronous machine equipped with a magnetic gearbox and an internal stator was designed in the Ansys Maxwell environment. The gearbox is equipped with a layer of iron poles by which the magnetic field is transferred. The designed machine contains magnets magnetised in antagonistic directions (vectors alternately rotated every 180 degrees). Other cases were also considered in the simulation studies, i.e. with magnets magnetised according to the Halbach concept and according to the modified Halbach concept. Beveling of the stator grooves was also considered. Two stator implementations were considered: inside the machine and outside the machine. The entire machine does not exceed a diameter of 140 mm.

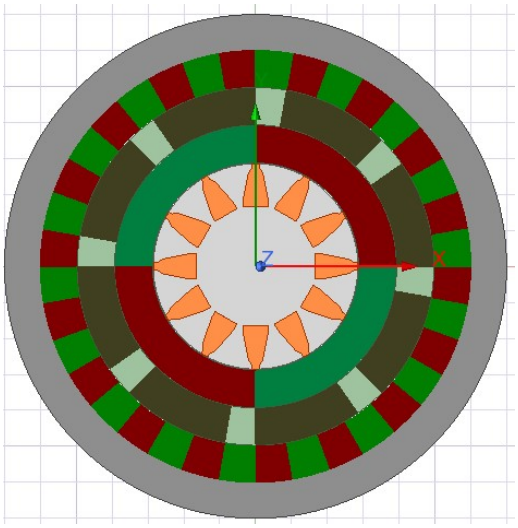

Fig.1. High Torque Permanent Magnet Synchronous Machine construction in Ansys Maxwell software.

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