

“Electric Machine Design Using Ferrite Permanent Magnet”

Speaker’s Short Biography:

Mohammad Mizanoor Rahman (Mizan) was born in Abu-Dhabi, United Arab Emirates (UAE), in 1987. He received his Bachelor’s (B.Sc.) degree in Electrical and Electronic Engineering (EEE) from International Islamic University Chittagong (IIUC), Chittagong, Bangladesh, in 2011 and Master of Science (M.Sc.) degree from University of Ulsan (UOU), Ulsan, South Korea in 2013. Mizan was awarded scholarship for Master’s by the research fund of University of Ulsan (UOU). Other than that he was also granted by prestigious Korean government scholarship of Brain Korea 21(BK21) program and also the prestigious grant of National Research Foundation (NRF) of Korea. During his masters he worked as a research assistant for Energy Mechatronics Laboratory (EMLAB), where his research field includes the motor design, motor analytical analysis and numerical analysis of BLDC motor. While working there he had designed an analytical model of several Spoke type motors for neodymium permanent magnet free which are published as journals in IEEE Transactions on Magnetics. Since 2014, he has been working towards his Ph.D. under Canada Excellence Research Chair in Hybrid Powertrain Program (CERC) at McMaster Institute for Automotive Research and Technology (MacAUTO) in McMaster Automotive Resource Center (MARC), Canada. He is a vice chair of power chapter in IEEE Hamilton Section, Canada. He holds one of the prestigious scholarships of Canada known as International Excellence Award. His current research interest includes the field of Electric Machines.

Abstract:

Brushless dc (BLDC) motors are penetrating the market of home appliances, HVAC industry, and automotive applications in recent years because of their high efficiency, silent operation, compact form, reliability, and low maintenance. Nowadays, electrical motors account for 65% of the worldwide energy consumption. The increasing availability of cost effective rare earth permanent magnet (PM) materials continues to spread PMDC machines into more applications. Spoke type BLDC motors are receiving significant attention from industries in the last decade. They are extremely inexpensive, reliable and less weight than other machines of comparable power outputs. Although the design principles of the machine are available as a concatenation of many different sources, the need for a unified, step-by-step design procedure from first principles of electromagnetics is an absolute requirement.

An approach is presented to the analytical design of spoke type permanent-magnet machines. The design model developed in this study incorporates facilities to include both the electromagnetic design and analytical design of the machine as well as to take into consideration the complexity of the permanent-magnet shapes, which is a typical requirement for the design of high-performance permanent-magnet motors. This research explores the advantages of the inexpensive spoke style PMDC machine topology. Finite element analysis (FEA) is used to explore intricate electromagnetic performance characteristics.