**METU – EEE**

Middle East Technical University – Electrical Electronics Engineering Department

**PROJECT REPORT**

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within the scope of the course

**EE568**

**SELECTED TOPICS ON ELECTRICAL MACHINES**

*by* Dr. Ozan KEYSAN

2019 – 2020 Spring Semester

**PROJECT REPORT NO** : 04

**PROJECT NAME** : PM Motor Comparison Analysis

**ASSIGN / DUE DATE** : 03.06.2020 / 28.06.2020 , 23:59

Literature Review

In this study, 1kW permanent magnet synchronous machine (PMSM) type servo motor design aspects are discussed. In this concept, several comparative designs are modelled with FEA performance considerations. Servo motors are essential machines in industrial applications and have a basic specific property as high torque with low inertia (sausage type machine) for acceleration, speed, position accuracy and performance. Providing the basic property depends on machine parameters such as diameter of the rotor-stator, pole-slot number, slot dimension, winding types, permanent magnet type etc. Design of these parameters effect the magnetic and electric load distribution, air gap flux density distribution (harmonic contents), flux leakages, cogging torque, end winding losses, thermal performance, machine dimension and cost.

1. Analytical Calculations & Sizing

There are

**Torque Generation**

For DC current excitation,

**Suggestions for Improving System**

The coils

2. FEA Modelling

For the

**2a) Flux Density Vectors for Linear Materials (0, 45, 90 degree rotor)**

Flux density

**2b) Inductances and Stored Energy in the System**

Inductances

**2c) Torque Generation in the System**

Torque

3. Comparison & Discussion

In this section,

**3a) Flux Density Vectors for NonLinear Materials (0, 45, 90 degree rotor)**

curve) stator and rotor material

**3b) Inductances and Stored Energy in the Nonlinear System**

**3c) Torque Generation in the Nonlinear Material System**

As expected,

**3d) The effects of fringing and saturating effects with the linear and non-linear materials**

The difference

4. Conclusion

Beacuse

# REFERENCES