Report: Torque in a Variable Reluctance Machine

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1 Introduction

This report examines a basic variable reluctance machine. A set of values, dimensions vsvs are given. From these values an analytical model of the machine is obtained. This model includes an analytical formula for the relucatance and the inductance of the system as a fucntion of rotation of the variable reluctance machine. Then, torque characteristics are plotted, while machine coil is under DC excitation.

2 Method

3 Modelling

3.1 Analytical Modelling

3.2 FEA Modelling: 2D - Linear Materials

3.3 FEA Modelling: 2D - Nonlinear Materials

3.4 Control Method

$$T = \frac{1}{2} * i^2 * \frac{d\mathrm{L}(\theta)}{d(\theta)} \tag{1}$$

$$\mathrm{i(t)} = \mathrm{I_m} * \sin(\mathrm{w_r t}) \tag{2}$$

$$\delta = \sqrt{\frac{2\rho}{\omega\mu}} \tag{3}$$

3.5 Analytical Modelling

3.6 Motion Animation

3.7 FEA Modelling: 3D

4 Results

5 Evaluation