**Keegan Smith**

**Electromechanics HW2**

**Submission Date:** 2/23/23

**Due Date:** 2/24/23

1. Diagram, schematic

   Description automatically generated**Manual calculations**

Chart

Description automatically generated**B1. Graph of Primary Current, Primary Flux Linkage, Primary Input Voltage, Secondary Induced Voltage**

**B2. Peak values of B1 Waveforms compared to the Analytical Values**

|  |  |  |
| --- | --- | --- |
| **Value** | **Simulated Results** | **Calculated Results** |
| **Primary Current** | 11.6560 [A] | 253.303 [mA] |
| **Primary Flux Linkage** | 1.0505 [wb] | 0.7639 [wb] |

**B3. Flux Density Distribution in the Core, Flux Density Magnitude on the Dashed Line in the Core, Average Flux Density on the Dashed Line, Simulated vs. Calculated Values**

Graphical user interface

Description automatically generatedFlux Density Distribution in the Core

Chart, line chart

Description automatically generated Flux Density Magnitude on the Dashed Line in the Core

Average Flux Density on the Dashed Line

The average flux density on the dashed line is a value of 742.3811 [T]. This value can be seen on the plot titled “Flux Density Magnitude on the Dashed Line in the Core”.

Average Flux Density Simulated vs. Calculated Values

|  |  |  |
| --- | --- | --- |
| **Value** | **Simulated** | **Calculated** |
| **Flux Density** | 742.3811 [T] | 1.061 [T] |

The difference of value between the simulated and calculated is likely due to the differences in magnetization current (I­m). The calculated value makes sense with about 0.25A of current, and “scaling” those results up to around 11A, the differences have logic. However, I am unsure why there are differences in the currents. I suspect that the simulated current is not the magnetization current, making the calculated value the flux density for magnetization.

**B.4 FFT of Primary Current**

Chart

Description automatically generated

**C1. Plot of primary current, primary flux linkage, secondary induced voltage**

Diagram

Description automatically generated with low confidence

**C2. Compare the peak and primary current and primary flux linkage with those obtained in task B**

|  |  |  |
| --- | --- | --- |
| **Value** | **Part B** | **Part C** |
| **A primary** | 11.6560 [A] | 338.2116 [A] |
| **Flux Linkage Primary** | 1.0505 [wb] | 0.1191 [wb] |

**C3. Plot Flux Density Distribution, Flux Density Magnitude on the dashed line in the core, Determine the Average Flux Density on the dashed line**

Chart, line chart

Description automatically generated

**C4. FFT on the Primary Current**

Chart, line chart

Description automatically generated