Analysis and Design of Single-Sided, Slotted AMM Axial-Field Permanent Magnet Machines

by

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Appendix A

Motor Drive System for the 32mm Motor in Chapter 3

PHOTOGRAPH of the motor drive system utilised in Chapter 3.
Appendix A  
Motor Drive System for the 32\textit{mm} Motor in Chapter 3

Figure A.1. PIC based motor controller

Figure A.2. Inverter module
FE Simulation Results - (Mesh Size Settings)

FINITE element simulated plot graphs from section 6.2.1 are given.
Appendix B  
FE Simulation Results - (Mesh Size Settings)

B.1 Case 1

All parts auto mesh (5mm)

Figure B.1. JMAG half model Case 1, mesh view (6,465 nodes, 21,778 elements)

Figure B.2. JMAG half model Case 1, back-EMF, tooth and yoke flux plots

Figure B.3. JMAG half model Case 1, cogging torque and axial force plots
Appendix B  

FE Simulation Results - (Mesh Size Settings)

B.2 Case 2

Mesh size of stator - 5mm, stator and magnet face (airgap)-1mm, other parts auto mesh

Figure B.4. J MAG half model Case 2, mesh view (18,053 nodes, 56,801 elements)

Figure B.5. J MAG half model Case 2, back-EMF, tooth and yoke flux plots

Figure B.6. J MAG half model Case 2, cogging torque and axial force plots
B.3 Case 3

Mesh size of stator - 3mm, stator and magnet face (airgap)-1mm, other parts auto mesh

Figure B.7. JMAG half model Case 3, mesh view (21,216 nodes, 78,701 elements)

Figure B.8. JMAG half model Case 3, back-EMF, tooth and yoke flux plots

Figure B.9. JMAG half model Case 3, cogging torque and axial force plots
Appendix B
FE Simulation Results - (Mesh Size Settings)

B.4 Case 4

Mesh size of stator - 2\text{mm}, stator and magnet face (airgap)-1\text{mm}, other parts auto mesh

Figure B.10. J MAG half model Case 4, mesh view (29,804 nodes, 126,687 elements)

Figure B.11. J MAG half model Case 4, back-EMF, tooth and yoke flux plots

Figure B.12. J MAG half model Case 4, cogging torque and axial force plots


B.5 Case 5

Mesh size of stator - 1\( mm \), stator and magnet face (airgap)-1\( mm \), other parts auto mesh

Figure B.13. J MAG half model Case 5, mesh view (88,584 nodes, 45,6312 elements)

Figure B.14. J MAG half model Case 5, back-EMF, tooth and yoke flux plots

Figure B.15. J MAG half model Case 5, cogging torque and axial force plots
Appendix B  
FE Simulation Results - (Mesh Size Settings)

B.6 Case 6

Mesh size of stator - 3mm, other parts auto mesh

Figure B.16. J MAG half model Case 6, mesh view (10,878 nodes, 42,442 elements)

Figure B.17. J MAG half model Case 6, back-EMF, tooth and yoke flux plots

Figure B.18. J MAG half model Case 6, cogging torque and axial force plots
B.7 Case 7

Mesh size of stator - 2\textit{mm}, other parts auto mesh

![Mesh view of Case 7](image)

**Figure B.19.** JMAG half model Case 7, mesh view (19,490 nodes, 85,938 elements)

**Figure B.20.** JMAG half model Case 7, back-EMF, tooth and yoke flux plots

**Figure B.21.** JMAG half model Case 7, cogging torque and axial force plots
Appendix B  FE Simulation Results - (Mesh Size Settings)

B.8 Case 8

Mesh size of stator - 1mm, other parts auto mesh

Figure B.22. JMag half model Case 8, mesh view (85,175 nodes, 445,104 elements)

Figure B.23. JMag half model Case 8, back-EMF, tooth and yoke flux plots

Figure B.24. JMag half model Case 8, cogging torque and axial force plots


Bibliography


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