**MIDDLE EAST TECHNICAL UNIVERSITY**

**ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT**



**EE463 STATIC POWER CONVERSION-I**

**PROJECT #2 REPORT**

**Design of a SM-PMSM Variable Frequency Drive with Matlab/Simulink**

**Due Date: 02.06.2019**

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# INTRODUCTION

# PART A: Pre-design Stage

1. Rated torque of the motor is Tnominal , 300Nm. Rated speed of the motor is found by (1) and (2).
2. The maximum applied electrical frequency is found by (3).

In LV applications where the inverter output is in between 380-460Vrms , IGBT voltage class in tow-level inverter topology is 1200V. In Figure A.1, total semiconductor losses as a function of carrier frequency can be seen. [1]. Choosing FF200R12KS4 as our IGBT and 2000W as a reasonable loss we decided to use 5000Hz. In this case mf is given by (4). Since we are operating below mf =21, mf should be an odd integer. To have mf approximately equal to 11, we chose fs as **5130Hz.**

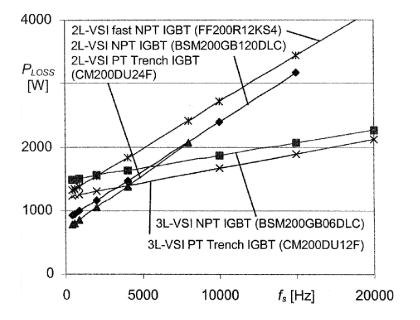


Figure A.1: Total semiconductor loss as a function of carrier frequency

# PART B: Sinusoidal PWM

# PART C: Space Vector PWM (SVPWM)

# PART D: Component selection and verification

# CONCLUSION

# References