

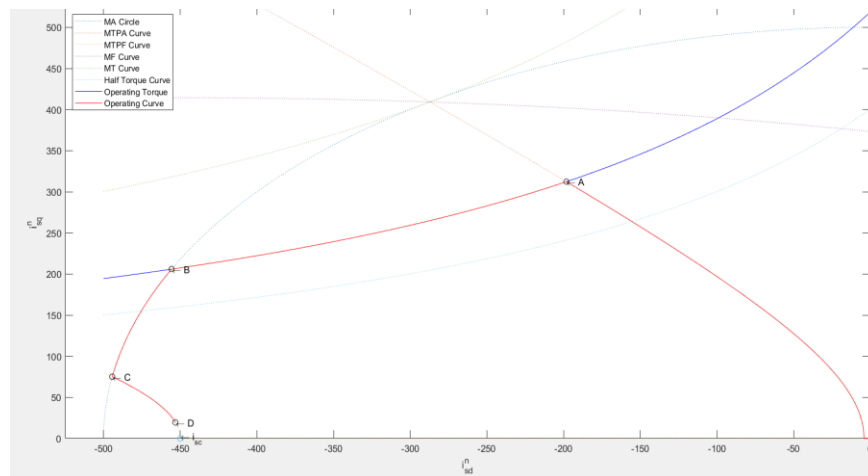
Banerjee, Dipankar	MATLAB programming, Concept.	Dipankar Banerjee
Tamakuwala, Meet Chetankumar	MATLAB programming verification, Report.	Meet Tamakuwala
Yerovi, Ivan	Alternative MATLAB programming, Verification.	Ivan Yerovi

Task 1.1

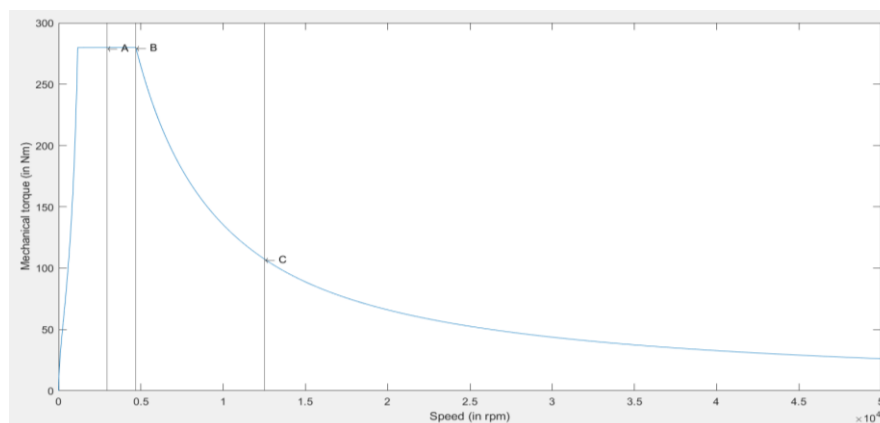
- a)
- Operation along the MTPA trajectory leads to lowest ohmic losses in the machine.
 - It is desirable to operate with the largest feasible torque at stator flux linkage limit (MTPF).
- b) The script for reference currents is attached along with this report.
- c) No, Major challenges are faced during the project. Small problems are solved easily during verification.

Task 1.2

- a) Graph of the current trajectory with i_{sq} (i_{sd}) for the reference torque of 70 Nm and a speed range of 0 - 50000 rpm.



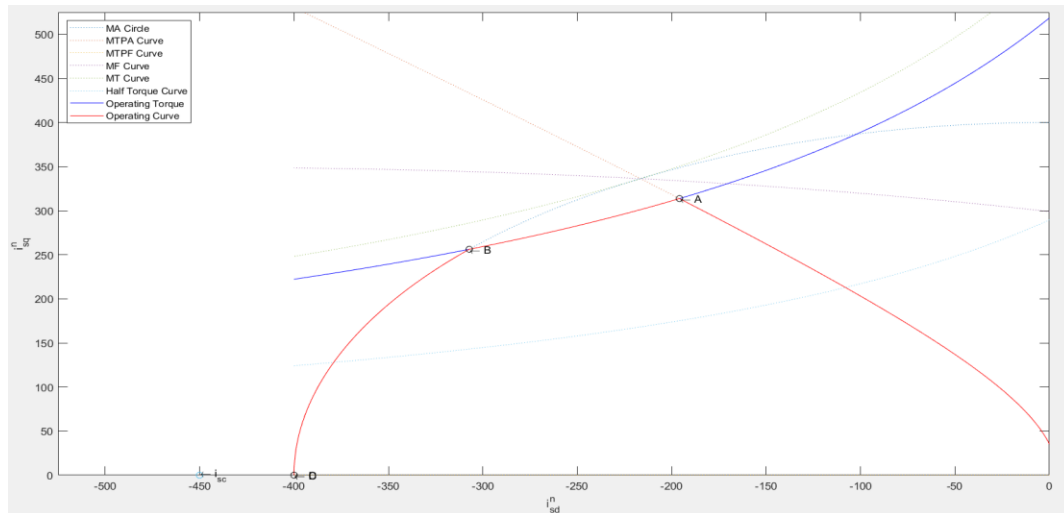
- b) Graph of the torque over speed map T_m (n) for $n = 0 - 50000$ rpm.



- c) Base speed operation along the MTPA for the reference torque of $T_e^* = 70 \text{ Nm}$ is possible until a speed of 2940 rpm is reached.
- d) A torque of $T_e^* = 70 \text{ Nm}$ can be delivered until a speed of 4683 rpm is reached.

Task 1.3

- a) No, An operation at short circuit current is not safe. A value of $K < 1$ signifies that short circuit operation occurs within the limitation of machine and converter.
- b) The current trajectory $i_{sq}(i_{sd})$ for a reference torque of $T_e^* = 70 \text{ Nm}$ and a speed range of $n = 0 - 50000 \text{ rpm}$ as well as the MTPA, MTPF, the MA circle and the short circuit current.



- c) The actively cooled inverter allows the machine to deliver more torque in the field weakening operation. Furthermore, the machine can only reach a maximum speed of nearly 48000 rpm with passive cooling while with active cooling the maximum reachable speed is theoretically infinite and the speed of 50,000rpm is actually reachable.

