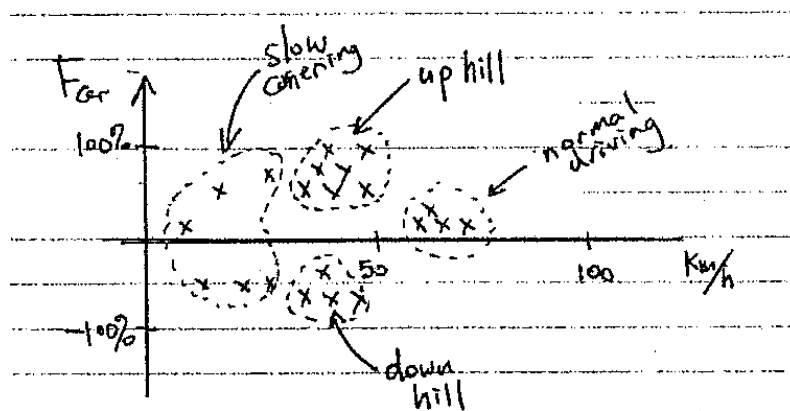


Question 1



Add explanation to each data group

Question 2

Operational differences

- (a) In-wheel motor with planetary reduction gear. Indirect motor drive.
- (b) In-wheel motor with motor direct drive to wheel

Advantages/disadvantages

- (a) Motor size small. (b) motor size big.
- (a) Include gear- mechanically complex. (b) direct drive simple mechanics
- (a) Overall weight and inertia is lower. (b) Higher inertia and weight
- (a) Gear will reduce efficiency. (b) Direct drive more efficient

Question 3

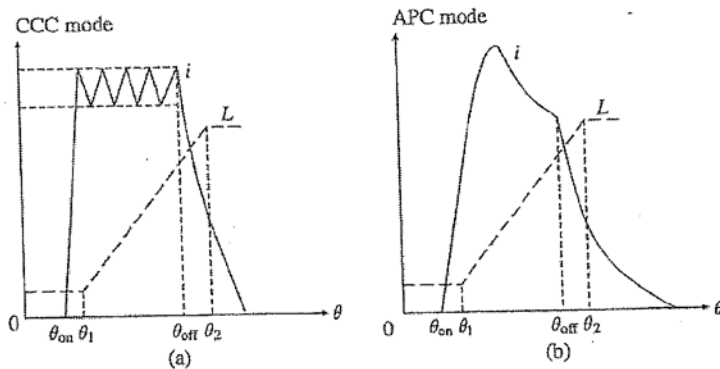
Diagrams of a brush type dc motor and a brushless dc motor.

(refer to page 7 & 8 of notes 5-22)

Why brushless dc motor is preferred in EV?

1. Brush cause wearing and sparks – it is unreliable in EV, and it causes safety concern.
2. The commutator limits the current through the motor, limits the power output of motor.
3. Brush motor has heat dissipation problem of the coil. Hence the peak power is limited.
4. Brushless motor has none of the above problems. Overall it has a higher power to size ratio, more reliable, and has no wear and tear problem.

Question 4



CCC: regulate the current supplied to the coil through feedback control (for low speed use)
 APC: switch on and switch off current supply at particular positions (for high speed use)

At low speed the controller's speed is fast enough to regulate the current of the coil through feedback control. Therefore current shaping is used. At high speed the controller cannot catch up with the speed of the turning rotor, therefore on/off control is used. However, at such high speed, due to the inertia of the rotor, the motor will turn very smoothly with no irregularities.

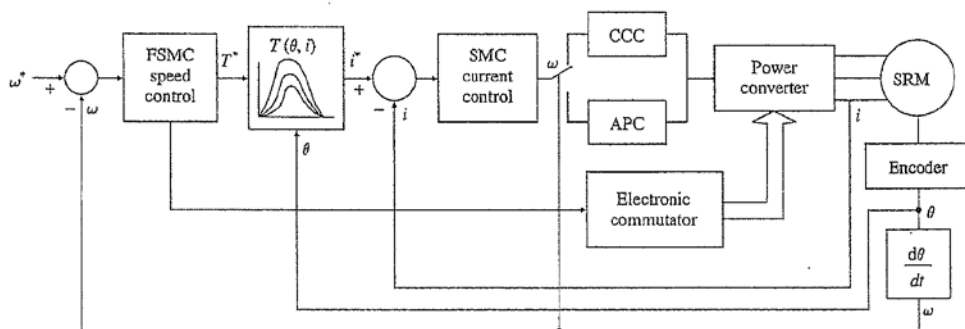


Fig. 5.66. FSMC system of a SR motor drive.

Add some explanation to the diagram above.

What are the main differences between CCC mode and APC mode in switched reluctance motor drive?

CCC	APC
1. for high speed	for slow speed
2. ON/OFF current switching	continuous current shaping
3. Hall effect position detection for rotor	Optical encoder continuous rotor position sensing