Electric Vehicle (EE60082)

Assignment

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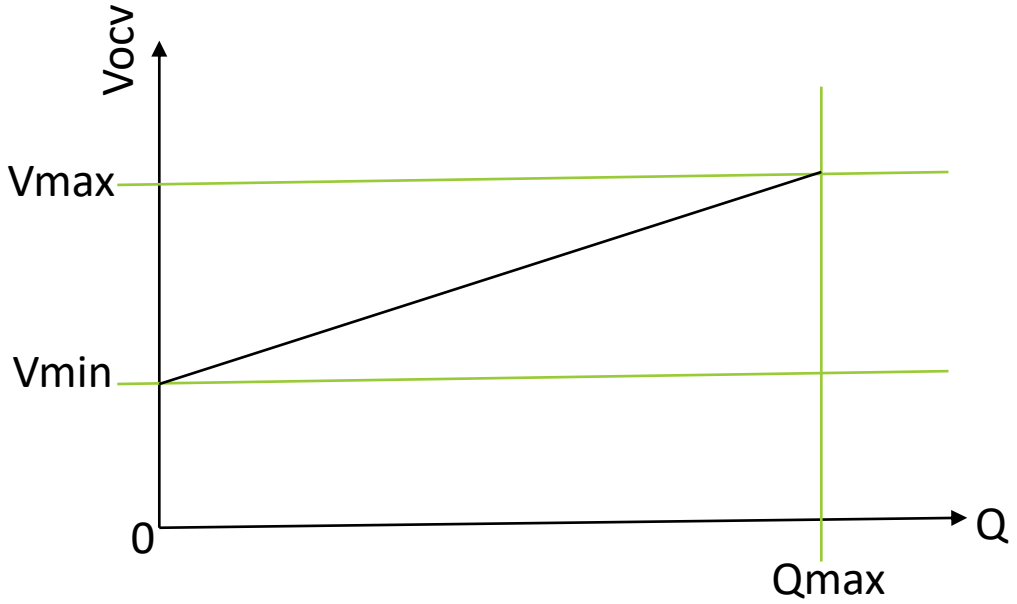
Assignment

Part A:

Develop a Simulink model for a battery pack with the following parameters:

- Charge capacity, Qmax = 100 Ah
- Maximum OCV, Vmax=420V
- Minimum OCV, Vmin=280V
- Internal resistance, Rs=1mΩ
- Initial charge in battery pack = Qini (which can be up to Qmax)
- OCV of the pack follows the relation in the figure on the right



Problem: Simulate and plot the terminal voltage Vt vs. time for constant current discharge with 1C and 2C rate from fully charged condition. What are the time for complete discharge and total charge delivered to load in each case?

Assignment

Part B:

Simulate the battery pack model and vehicle model together.

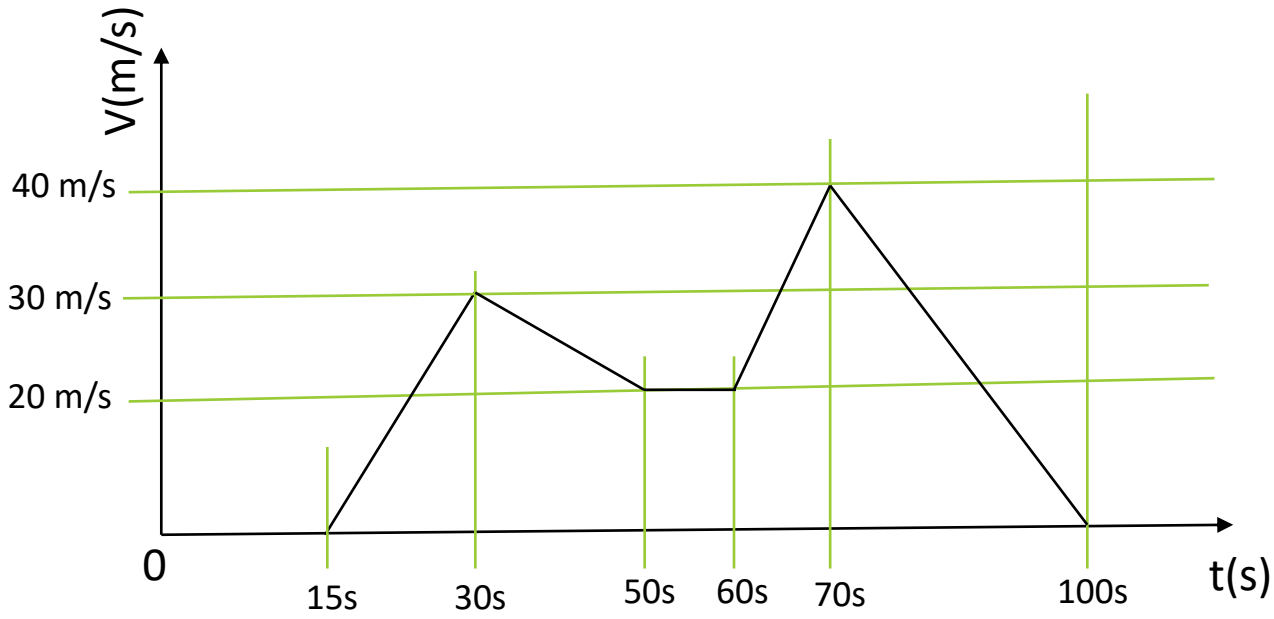
- Use same battery parameters as part A.
- Vehicle parameters:

  m=692kg, C_D = 0.2, A_F = 2m^2, f_0 = 0.009,

  f_s = 1.75*10-6 s^2/m^2, ρ= 1.18 kg/m^3, g = 9.81 m/s^2,

  wind speed V_w=0, α=0

- Simulate required power for EV when following the drive cycle in the figure on the right (drive cycle repeat every 100s).
- Simulate the battery current and voltage using controlled current source as vehicle load.
- Find the range of the vehicle
- Plot battery current, voltage, power, and vehicle velocity separately in same scope (4 channel scope)



Assignment

Report submission

- Submit a ppt or a pdf file with the following
  - Screenshots of simulation models
  - Screenshots of results
  - Your findings

- Submission method
  - Online through MS teams
  - Link will be shared soon

- Submission deadline
  - May 4th, 11:59pm
  - Hard deadline (no late submission acceptable)

- Assignment grading
  - grading based on efforts (try to attempt all the parts)
  - 20% contribution towards final grading

Thank you!