TÉCNICO LISBOA

Electrical Drives and Electrical Vehicles

Project – VIENA

#3 – Variable Speed Drive with speed regulator

I. OBJECTIVES

The main objectives of this second FIAT-competition project report are:

- Implement a variable speed drive with a speed regulator.
- To determine the proportional and integral constants for the speed regulation.

II. VARIABLE SPEED DRIVE WITH SPEED REGULATOR

The third part of the project will focus on the implementation of a Variable Speed Drive (VSD) with a speed regulator. Please note that in VIENA-part 2, the variable speed drive had an open loop command, where the Induction motor was controlled by its synchronous speed. Now, with the speed regulation, the rotor speed can be controlled, instead of the synchronous speed.

IMPLEMENTATION OF THE VARIABLE SPEED DRIVE WITH SPEED REGULATION

Using the Simulink block diagram developed in VIENA-part 2, Fig. 1, implement new block diagram of the VSD in Fig. 2. Now the reference speed, $\Omega_{r_{ref}}$ (given directly by the wheels speed values from part 1, in rad/s), will now be compared with the real rotor's speed.

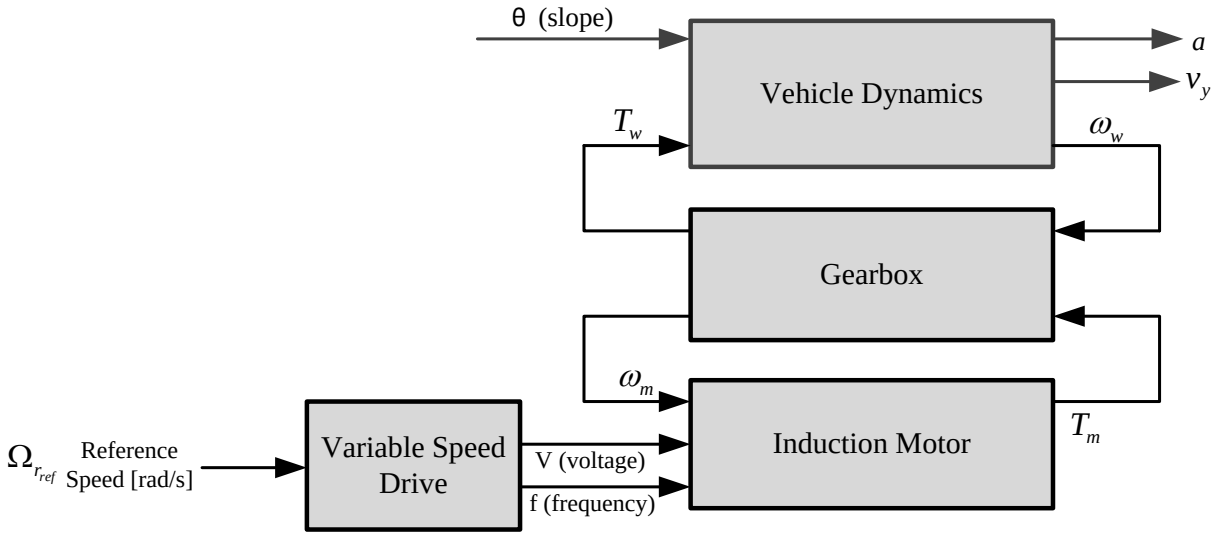

Fig. 1. Overall system block diagram

In the new VSD diagram, do not forget to include the relation V(f) from the motor's rated values.

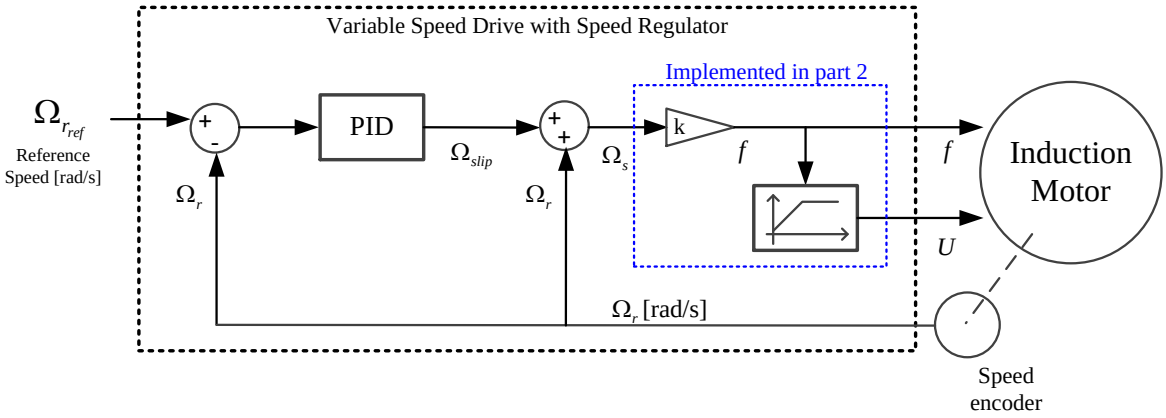

Fig. 2. Variable Speed Drive block diagram

For tracks AB and CDEF:

a) Consider PID with only a proportional gain, K. Be aware that if you use a very high value of K, the motor will have very high peak currents. Considering only the proportional gain, plot:
   1. In the same figure the reference speed and the real motor speed;
   2. The motor torque and stator current;
   3. The evolution of the motor voltage and frequency.

b) Repeat a), now considering a proportional, K, and an integral, I, gain. Compare the results with the previously obtained (with only K).