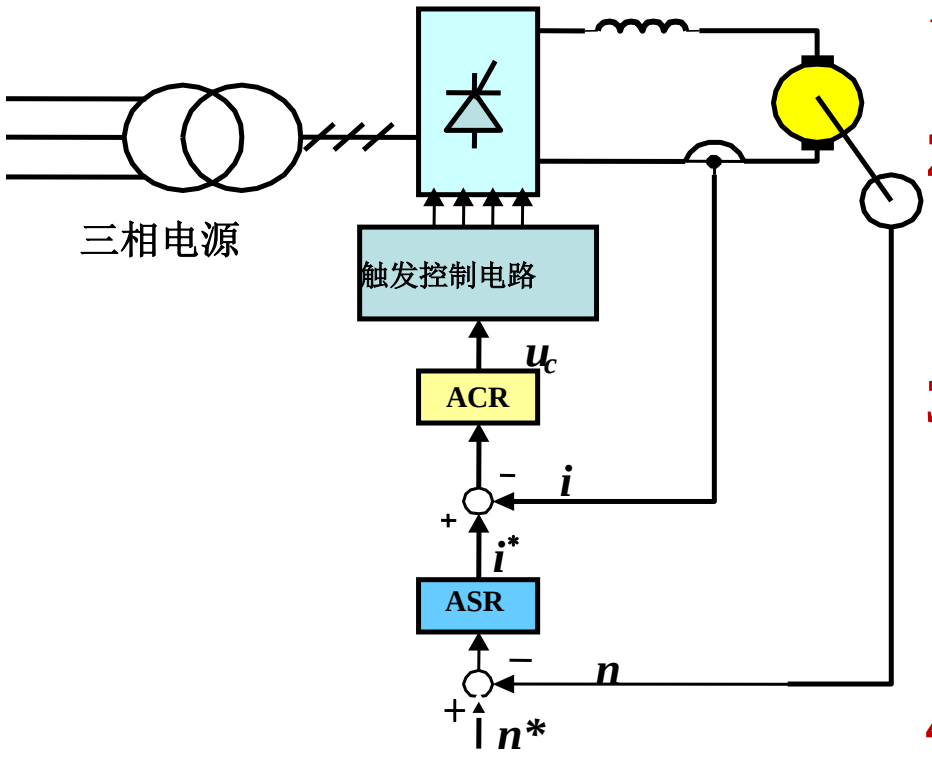
Simulation on Dual-loop DC Motor Drives

Design and simulate a dual-loop DC motor drive system as shown below by using MATLAB/SIMULINK.



1) **Power source: 3-phase 380V 50Hz;**
2) **Power electronics converter: Diode rectifier + Switching mode full bridge converter**
3) **DC Motor model: DC machines**
   Preset model: 01 5HP 240V 1750rpm Field:300V
   Mechanical output: Speed
4) **PWM method: optional**

1. Design ASR and ACR and determine their parameters. The output limit for ASR is 30, and the output limit for ACR is 300;

2. Simulate the system operating with step change from 1500rpm to 1200rpm without load, operating at 1200rpm with 3 seconds and step up to 1500rpm;

3. Simulate the system operating at 1500rpm without load at the initial, and then with a load change of 10Nm at t=3sec;

3. Give the input and output of each section in steady-state;

5. Discuss the effects and influences of Kp, Ki and output limit.

Notes:

(1) The basic principle is to speed up the acceleration process with minimum overshoot;

(2) Design the regulator parameters by control theory first and then adjust them manually;

(3) Determine the parameters of ACR (inner loop) first and then adjust the parameters of ASR (outer loop).

注：除之前作业中曾用过的元件外，本次仿真可能用到的元件：

1. **Control & Measurements->Pulse & Signal Generators->Stair Generator:产生阶跃信号。**

2. Fundamental Blocks->Machines->DC Machine:直流电机。

3. Simulink->Continuous->PID Controller:控制PI参数。

4. Simulink->Continuous->Transfer fcn:设置传递函数