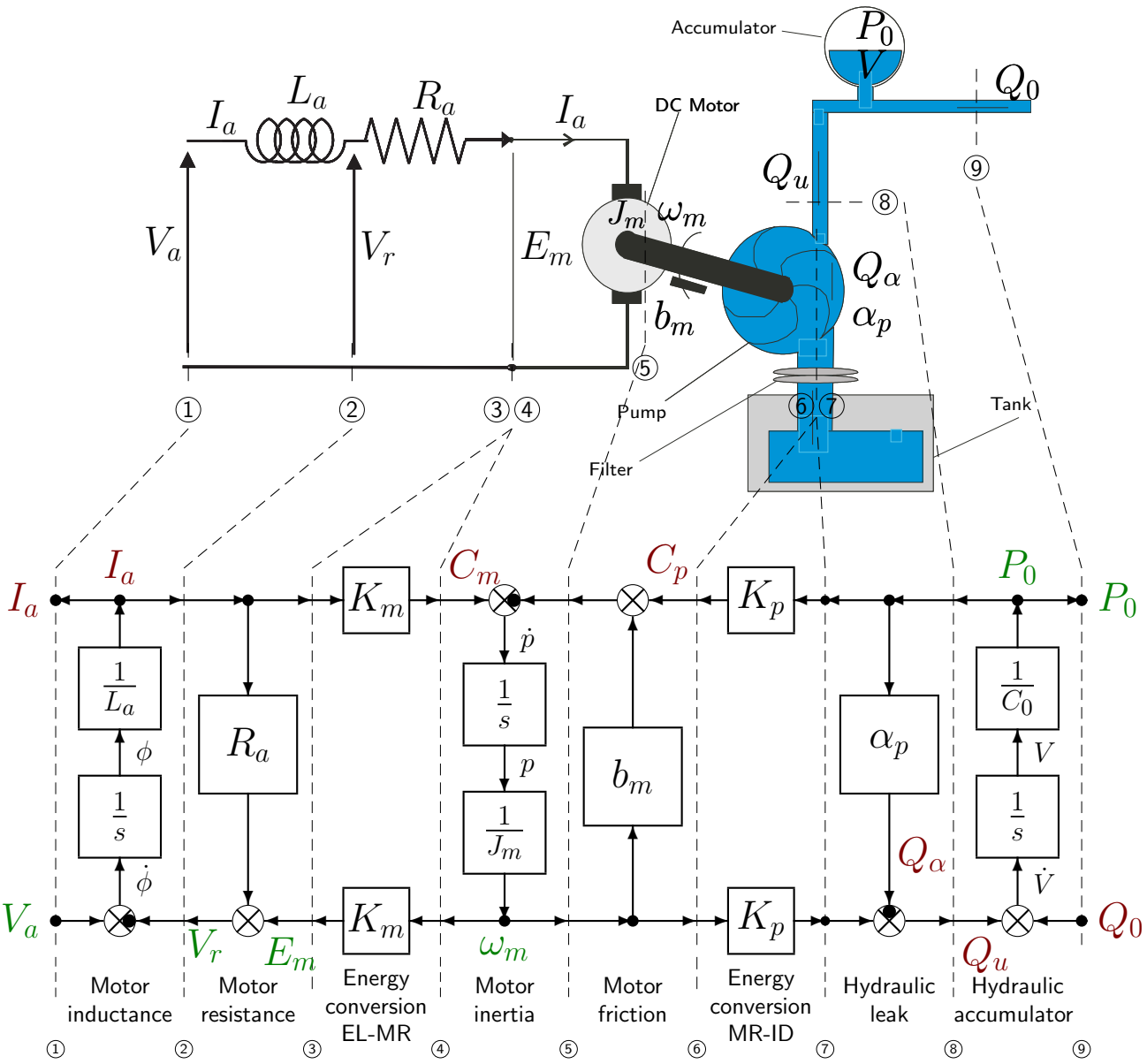
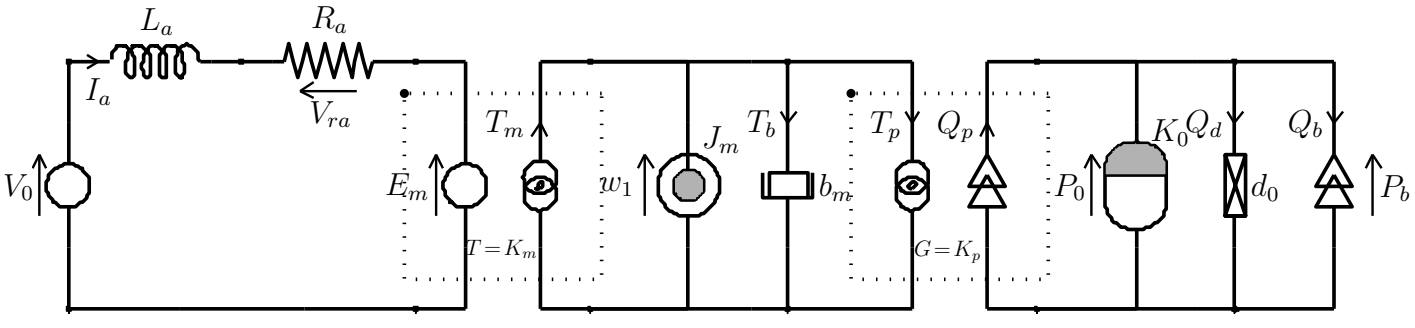
Electro Hydraulic Pump

- The considered physical system and the corresponding POG block scheme:



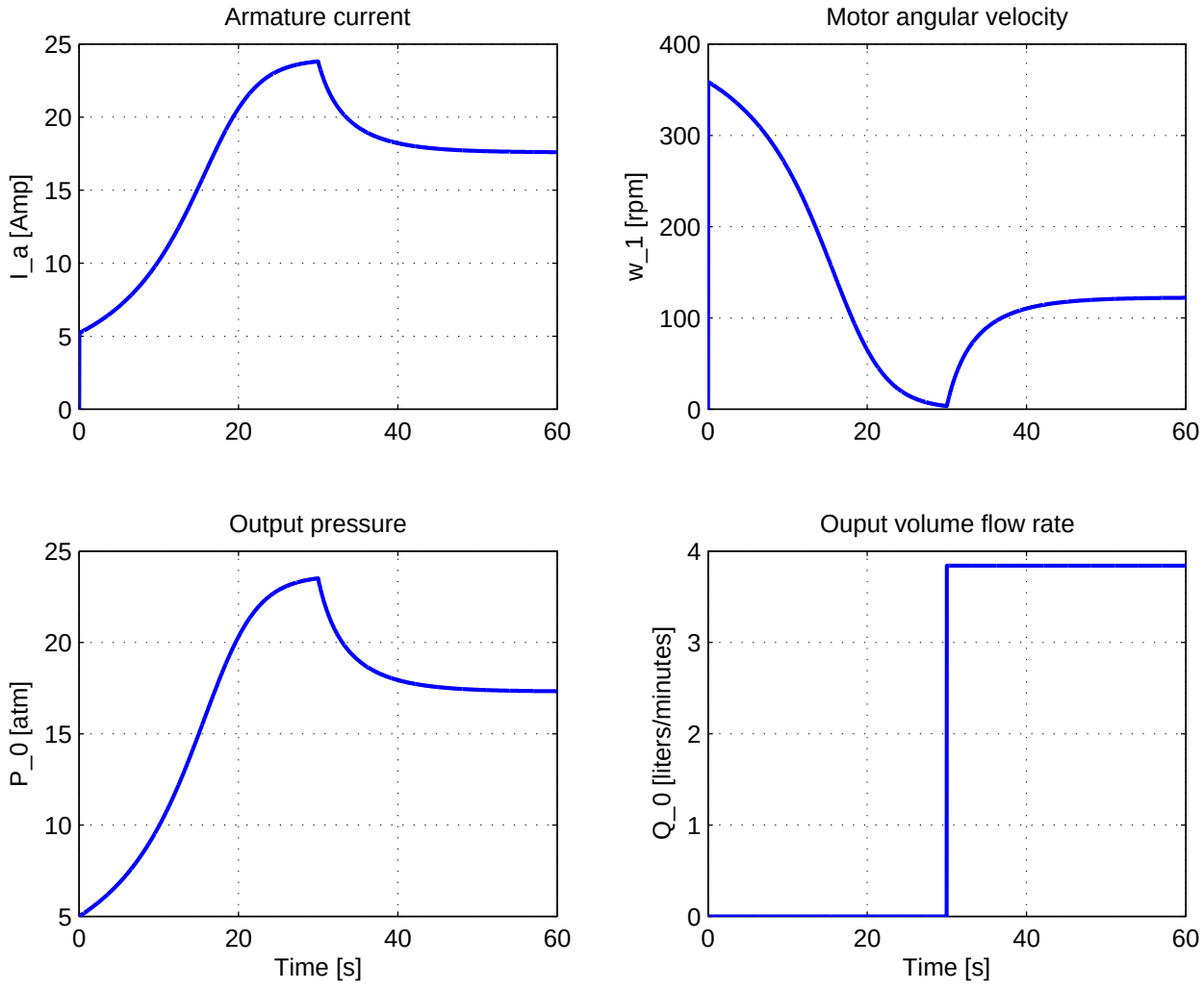
- The corresponding POG physical scheme obtained using the POG modeler:



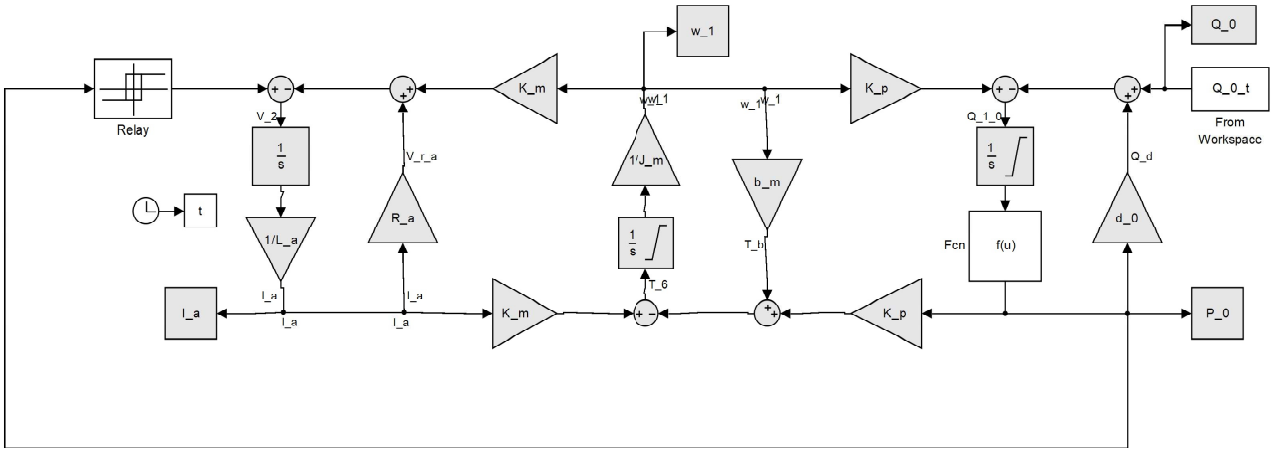
- System parameters:

```
-- Matlab commands ---- (POG_Electro_Hydraulic_Pump_NL_SLX_m) -------------
%%%%%%%%%%%   SYSTEM PARAMETERS  %%%%%%%%%%%%%%%%%%%%%%%%%%
L_a=0.3*mHenry;             % 2. Inductance. Internal parameter.
R_a=1*Ohm;                  % 3. Resistance. Internal parameter.
K_m=0.5;                    %  5. Parameter. Transformer/Gyrator.
J_m=1*cm^2*1*kg;            % 6. Inertia. Internal parameter.
b_m=0.02*Nm/(100*rpm);      % 7. Angular friction. Internal parameter.
K_p=5e-06;                  % 9. Parameter. Transformer/Gyrator.
K_0=100*atm/((10*cm)^3);    % 10. Hyd. Capacitance. Internal parameter.
d_0=(4*mm)^3/sec/(10*atm); % 11. Hyd. Conductance. Internal parameter.
P_0=5*atm;                  % Pressure of the hydraulic capacitor when V=0
V_0=(15*cm)^3;              % Volume of the hydraulic capacitor
%%%%%%%%%%%   INPUT VALUES  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
V_a=24*Volt;                % 1. Voltage. Input value.
Q_0=(4*cm)^3/sec;           % 12. Volume Flow rate. Input value.
t_0=30*sec;                 %
-------------------------------------------------------------------------
```

- Simulation results (POG_Electro_Hydraulic_Pump_NL_SLX.slx) in presence of nonlinearities:



- Simulink block scheme (POG_Electro_Hydraulic_Pump_Rele_SLX.slx) of the system controlled using a relay with hysteresis:



- Simulation results obtained by using the relay-controlled system: