D – Q model

For the fixed coordinate system d-q (ωto =), when axes are connected with the stator, Using Kirchhoff’s equation for general equation,



So, 



   

   

Substituting in (1.17) the expressions of the flux linkage



 

 

 

 

**Differentiation equation for flux linkages for stator and rotor**







After expressing the fluxs linkage through the currents, inductance and mutual inductance, just as for the coordinate system α-β, we will obtain the equations of the electromechanical conversion of energy in axes d- q, expressed through the currents:

 

 









For the poly phase machine the equation of internal torque,

 ; Where m – the number of phases.

Equation of the electromechanical conversion of energies, expressed through the flux linkage:



Internal torque can be determined through flux linkage and armature currents:



Internal torque can be determined also through flux linkage and currents of the rotor:



If rotor revolves with the variable angular velocity, then its motion is described by equation



Where J - total moment of the inertia of rotor and load mechanism of p - number of pole pairs; is moment of resistance that constant.