**Alpha – Belta coordinate system**

For the fixed coordinate systemα, β (ωto = 0), when axes are connected with the stator, Using Kirchhoff’s equation for general equation,



So, 



   

   

**Park’s Transformation**









S0,



Substituting in (1.17) the expressions of the flux linkage



 

 

 

 

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









Transformation of coordinates makes it possible to simplify equations and to obtain the constant coefficients before the variables, but does not decrease the number of equations.

In the theory of electro mechanics the method of replacing the variables widely is used. One of the methods of simplification in the equations – Using the expressions of flux linkage. For the generalized machine the currents through the flux linkages and the inductances

 

 

**Voltage equation for stator and rotor**









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:

 (1.30)

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.

We will obtain the equations of the electromechanical conversion of energy in the coordinate systemα,β expressed through the currents. Upon transfer from the untransformed coordinate system to the systemα, β from (fig 1.1) it is necessary to determine the projections of voltages and currents of rotor on the axis of stator according to the relationships

 (2.19)

 (2.20)