Q: Derive the equations by yourself as a good practice for 1) the DQ to UVW transform, and 2) UVW to DQ transform shown in slides 10 and 11, respectively.

A: Denote the current vector is , and the voltage vector is . Then, the power is . After transformation, the power is . Thus, , the transform matrix is orthogonal.

1. For the DQ to UVW transform:

After simplification and matrix normalization, the transform reads:

1. For the UVW to DQ transform:

Suppose the number of windings in UVW is and and in DQ.

Then, the magnetomotive force at DQ axis is equivalent to the projection from UVW axis, which implies:

Power conservation implies the ratio of winding is:

After simplifying cosine computations, in matrix form, the transformation reads: