

4.3 WAVE WINDING

This type of winding is used in dc generators employed in high-voltage applications. Notice that the two ends of each coil are connected to commutator segments separated by the distance between poles. This configuration allows the series addition of the voltages in all the windings between brushes. This type of winding only requires one pair of brushes. In practice, a practical generator may have several pairs to improve commutation. When the end connections of the coils are spread apart as shown in Figure a wave or series winding is formed. In a wave winding there are only two paths regardless of the number of poles. Therefore, this type winding requires only two brushes but can use as many brushes as poles. Because the winding progresses in one direction round the armature in a series of 'waves' it is known as wave winding. If, after passing once round the armature, the winding falls in a slot to the left of its starting point then winding is said to be retrogressive. If, however, it falls one slot to the right, then it is progressive

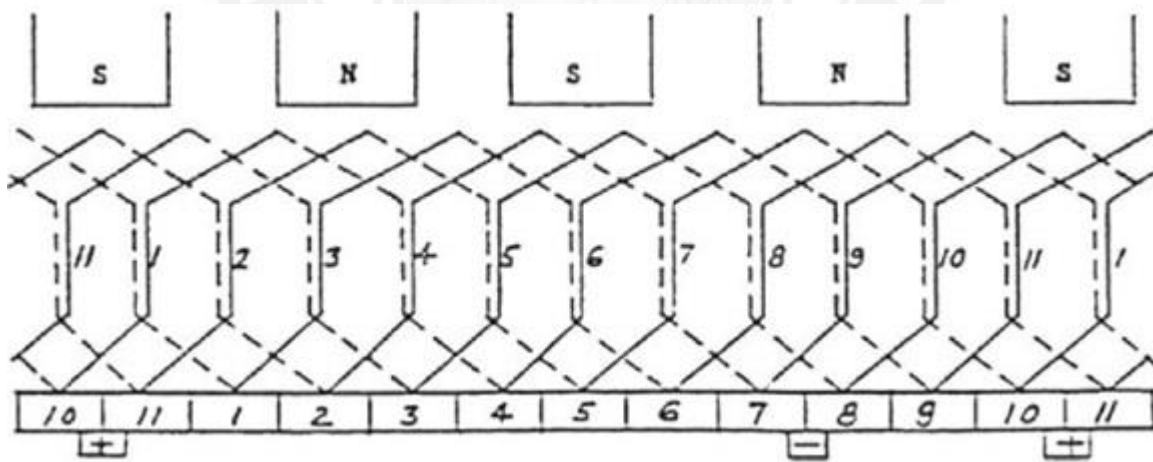


Figure 4.3.1 Wave winding diagram

[Source: “Electric Machinery Fundamentals” by Stephen J. Chapman, Page: 282]

1. YF are odd and of the same sign.
2. Back and front pitches are nearly equal to the pole pitch and may be equal or differ by 2, in which case, they are respectively one more or one less than the average pitch.
3. Resultant pitch $Y_R = Y_F + Y_B$.

4. Commutator pitch, $YC = YA$ (in lap winding $YC = \pm 1$). Also $YC = (\text{No. of commutator bars} \pm 1) / \text{No. of pair of poles}$.
5. The average pitch which must be an integer is given by $YA = (Z \pm 2)/P = (\text{No. of commutator bars} \pm 1) / \text{No. of pair of poles}$.
6. The number of coils i.e NC can be found from the relation $NC = (PYA \pm 2)/2$.
7. It is obvious from 5 that for a wave winding, the number of armature conductors with 2 either added or subtracted must be a multiple of the number of poles of the generator. This restriction eliminates many even numbers which are unsuitable for this winding.
8. The number of armature parallel paths = $2m$ where 'm' is the multiplicity of the winding.

