2.2 LAP WINDING

This type of winding is used in dc generators designed for high-current applications. The windings are connected to provide several parallel paths for current in the armature. For this reason, lap-wound armatures used in dc generators require several pairs of poles and brushes.

In lap winding, the finishing end of one coil is connected to a commutator segment and to the starting end of the adjacent coil situated under the same pole an so on,till all the coils have been connected. This type of winding derives its name from the fact it doubles or laps back with its succeeding coils. Following points regarding simplex lap winding should be noted:

1. The back and front pitches are odd and of opposite sign. But they can't be equal. They differ by 2 or some multiple thereof.

2. Both YB and YF should be nearly equal to a pole pitch.

3. The average pitch YA = (YB + YF)/2.It equals pole pitch = Z/P.

4. Commutator pitch YC = ±1.

5. Resultant pitch YR is even, being the arithmetical difference of two odd numbers i.e YR = YB - YF.

6. The number of slots for a 2-layer winding is equal to the number of coils. The number of commutator segments is also the same.

7. The number of parallel paths in the armature = mP where 'm' is the multiplicity of the winding and 'P' the number of poles. Taking the first condition, we have YB = YF ± 2m where m=1 fo simplex lap and m =2 for duplex winding etc.

8. If YB > YF i.e YB = YF + 2, then we get a progressive or right-handed winding i.e a winding which progresses in the clockwise direction as seen from the comutator end. In this case YC = +1.

9. If YB < size="1">F i.e YB = YF - 2,then we get a retrogressive or left-handed winding i.e one which advances in the anti-clockwise direction when seen from the commutator side. In this case YC = -1.

10. Hence, it is obvious that for

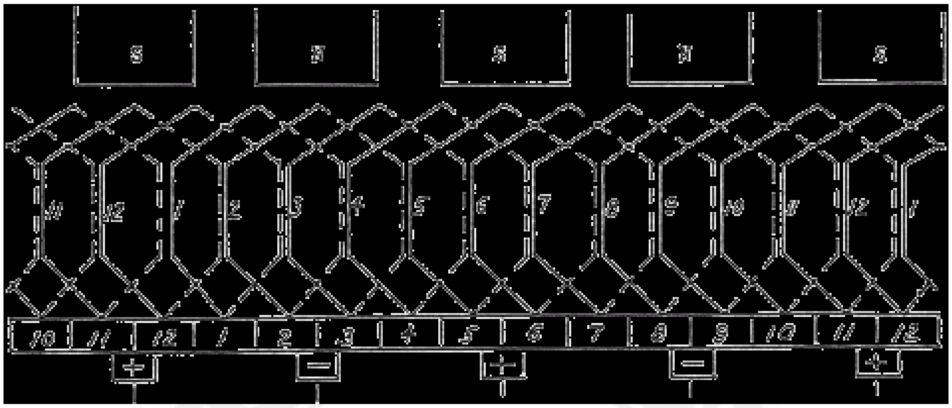

Figure 2.2.1 Lap Winding diagram

[Source: "'Electric Machinery Fundamentals" by Stephen J. Chapman, *Page: 281]*

Progressive winding	Retrogressive winding
$Y_B = \frac{Z}{P} + 1$	$Y_B = \frac{Z}{P} - 1$
$Y_F = \frac{Z}{P} - 1$	$Y_F = \frac{Z}{P} + 1$