SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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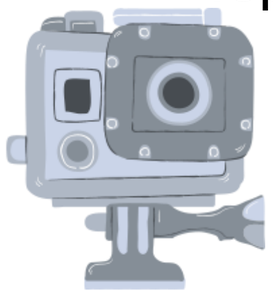
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EET207/ SYNCHRONOUS AND INDUCTION MACHINES

II YEAR / IV SEMESTER

Unit 5 – SPECIAL MACHINES

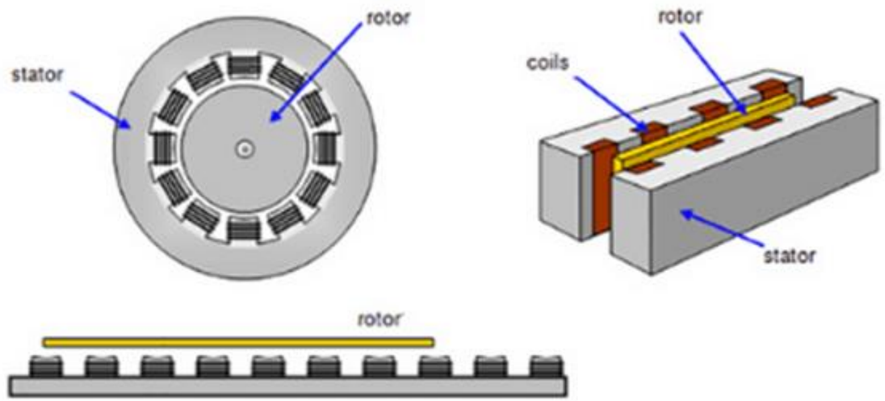
Topic 5: Linear induction motor and BLDC Motor

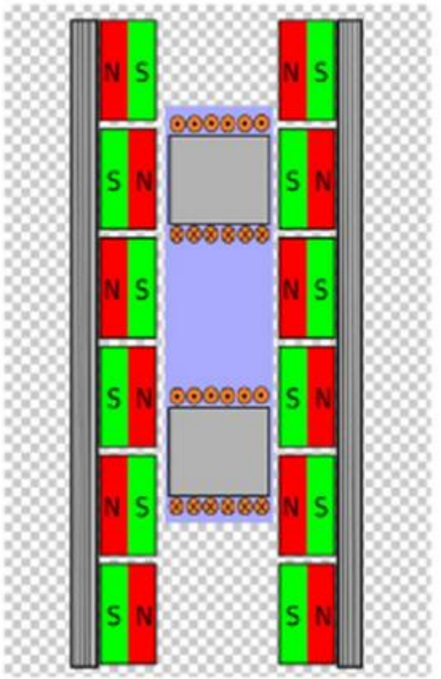


GUESS THE TOPIC NAME…

Linear induction motor

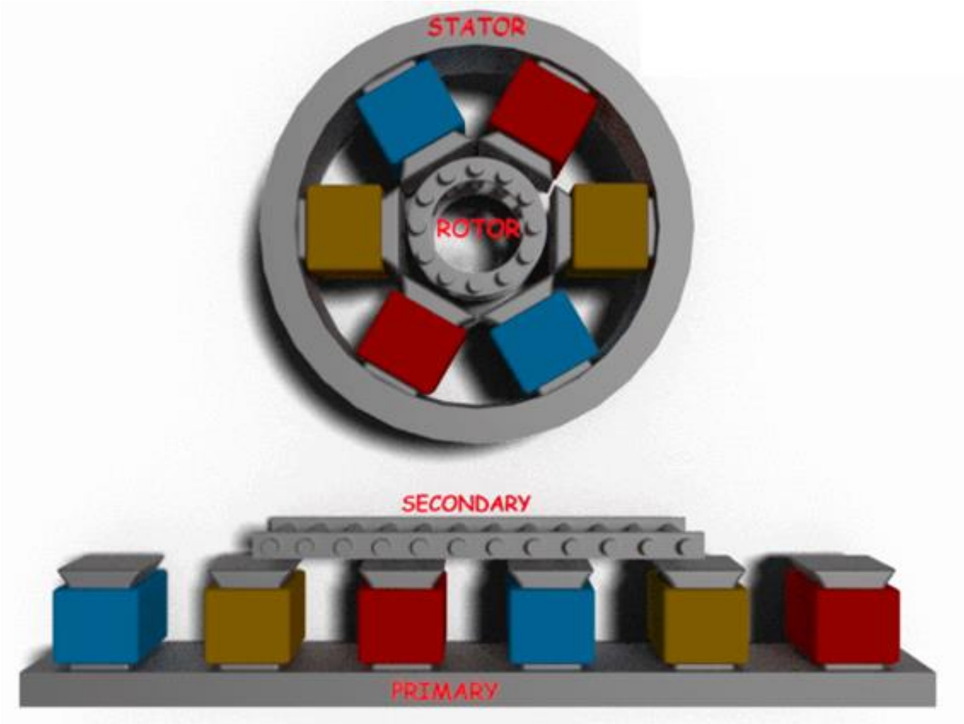
- A Linear Induction Motor (or LIM) is a special type of induction motor used to achieve rectilinear motion rather than rotational motion as in the case of conventional motors.
- Linear induction motors are quite an engineering marvel, to convert a general motor for a special purpose with more or less similar working principle, thus enhancing its versatility of operation.



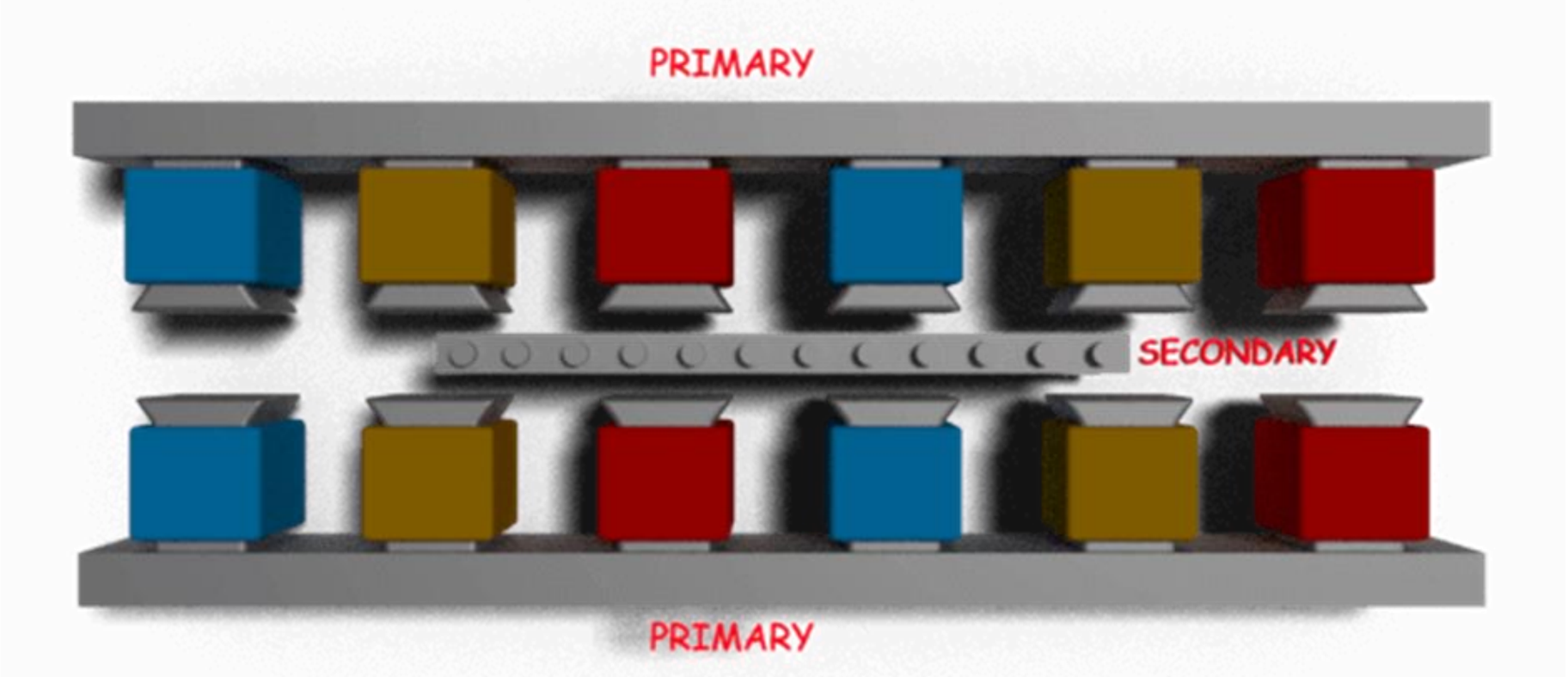


Linear induction motor

- The basic design and construction of a linear induction motor is similar to a three phase induction motor, although it does not look like a conventional induction motor.
- If we cut the stator of a polyphase induction motor and lay on a flat surface, it forms the primary of the linear induction motor system. Similarly, after cutting the rotor of the induction motor and making it flat, we get the secondary of the system.



Linear induction motor



There is another variant of LIM also being used for increasing efficiency known as the Double Sided Linear Induction Motor or DLIM, as shown in the figure below. It has primary on either side of the secondary, for more effective utilization of the flux from both sides.

Principle of operation

- When the primary of a LIM gets excited by a balanced three-phase power supply, a flux starts traveling along the entire length of the primary. This linearly traveling magnetic field is equivalent to the rotating magnetic field in the stator of a three phase induction motor or a synchronous motor.

- Electric current gets induced in the conductors of the secondary due to the relative motion between the traveling flux and the conductors. Then the induced current interacts with the traveling flux wave to produce linear force or thrust.

- If the primary is fixed and the secondary is free to move, the force will pull the secondary in the direction of the force and will result in the required rectilinear motion. When we give supply to the system the developed field will result in a linear traveling field, the velocity of which is given by the equation,

$$V_s = 2tf_s \; m/sec$$

Principle of operation

Where fs is the supply frequency in Hz, Vs is the velocity of the linear traveling field in meter per second, and t is the linear pole pitch i.e. pole to pole linear distance in meter.

$$V = (1 - s)V_s$$

For the same reason as in the case of an induction motor, the secondary or runner cannot catch the speed of the magnetic field. Hence there will be a slip. For a slip of s, the speed of the linear induction motor will be

Application of Linear Induction Motor

A linear induction motor is not that widespread compared to a conventional motor, taking its economic aspects and versatility of usage into consideration. But there are quite a few instances where the LIM is indeed necessary for some specialized operations.

Few of such applications are listed below.

Automatic sliding doors in electric trains.
Mechanical handling equipment, such as propulsion of a train of tubs along a certain route.
Metallic conveyor belts.
Pumping of liquid metal, material handling in cranes, etc.

SUMMARY

- Linear Induction Motor

KEEP
LEARNING..

Thank u

SEE YOU IN NEXT CLASS