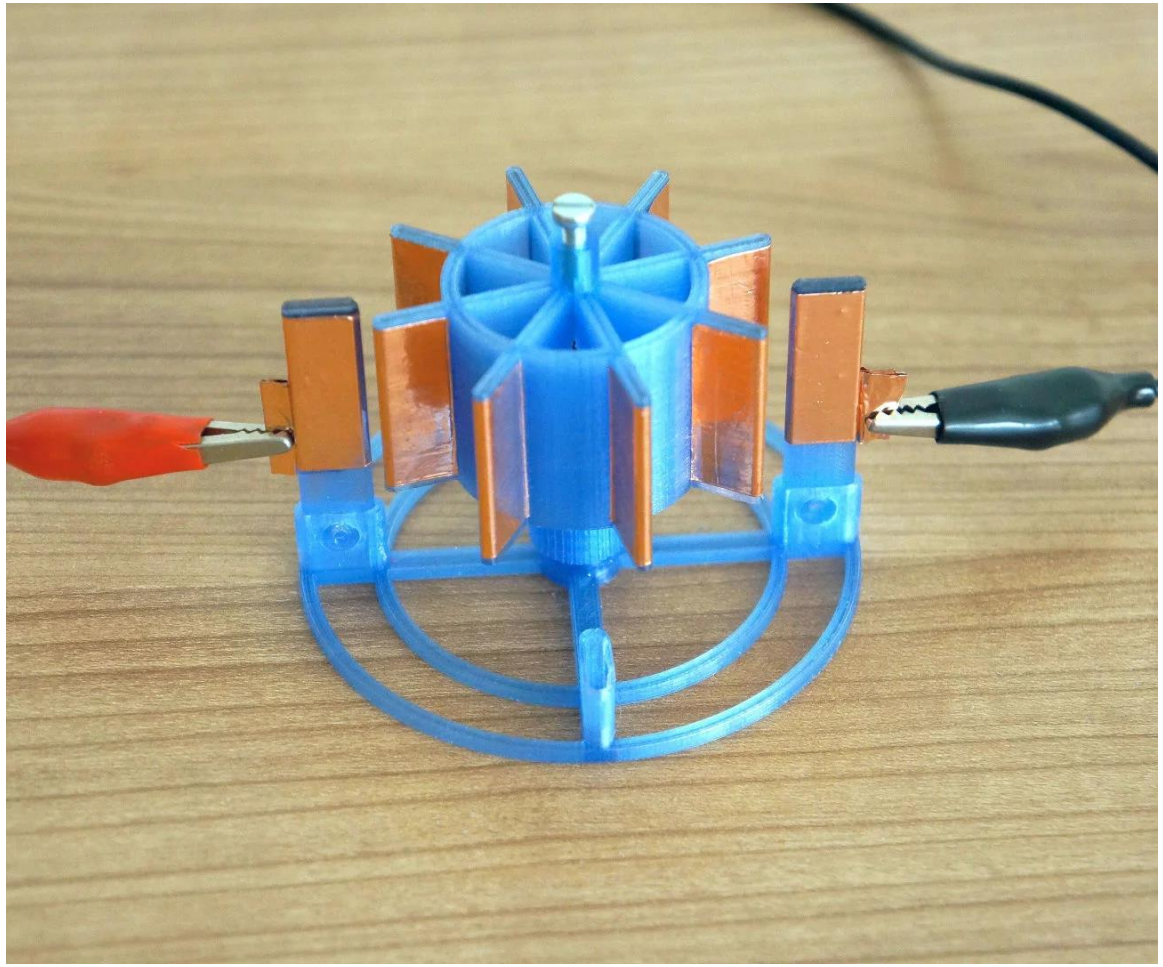
Course Code - EEE-401
Course Title – Energy Conversion and Special Machine
Lecture- Electrostatic Motor

Electrostatic Motor

Electrostatic Motor

- Electrostatic motor was invented in 1748 by Benjamin Franklin.
- It is also called capacitor motor.
- Electrostatic motor are the dual of a conventional coil based motor
- This type of motor is based on Coulomb forces, and its energy output is related to the change in electrostatic energy that occurs when charges are moved between the terminals of a high-voltage (HV) supply.
- This is different from a regular motor, which is based on magnetic forces and the change of magnetic-dipole energy in a magnetic field.



Construction of Electrostatic Motor

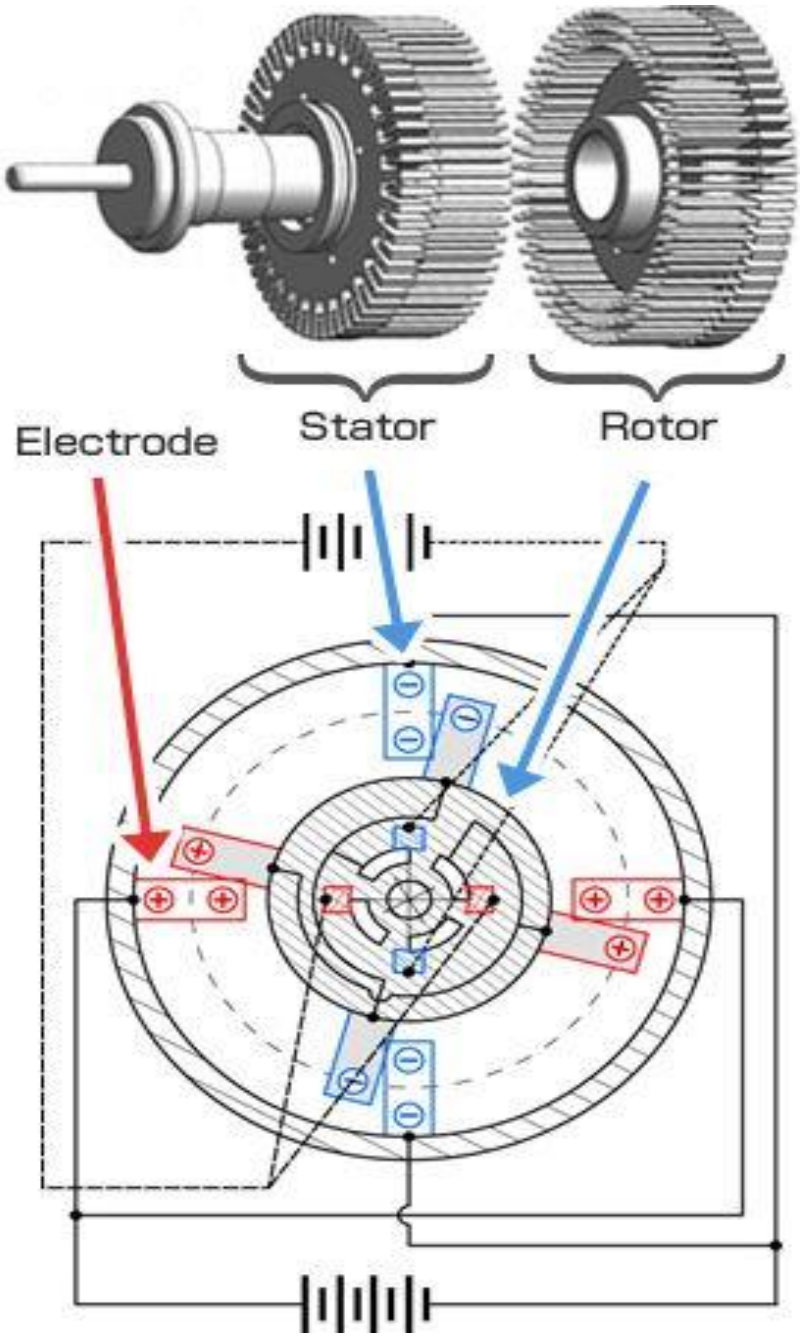
Construction of Electrostatic Motor

- **Stator**
  - It contains positive and negative charges electrode.
  - High voltage is applied to the stator

- **Rotor**
  - It has a plastic body and
  - Positives and negative charge electrode are placed on the plastic body.

- **Bearing**
  - There are several bearing in electrostatic motor.
  - The upper bearing only picks up small transverse forces.
  - The bottom bearing will carry the rotor’s weight.

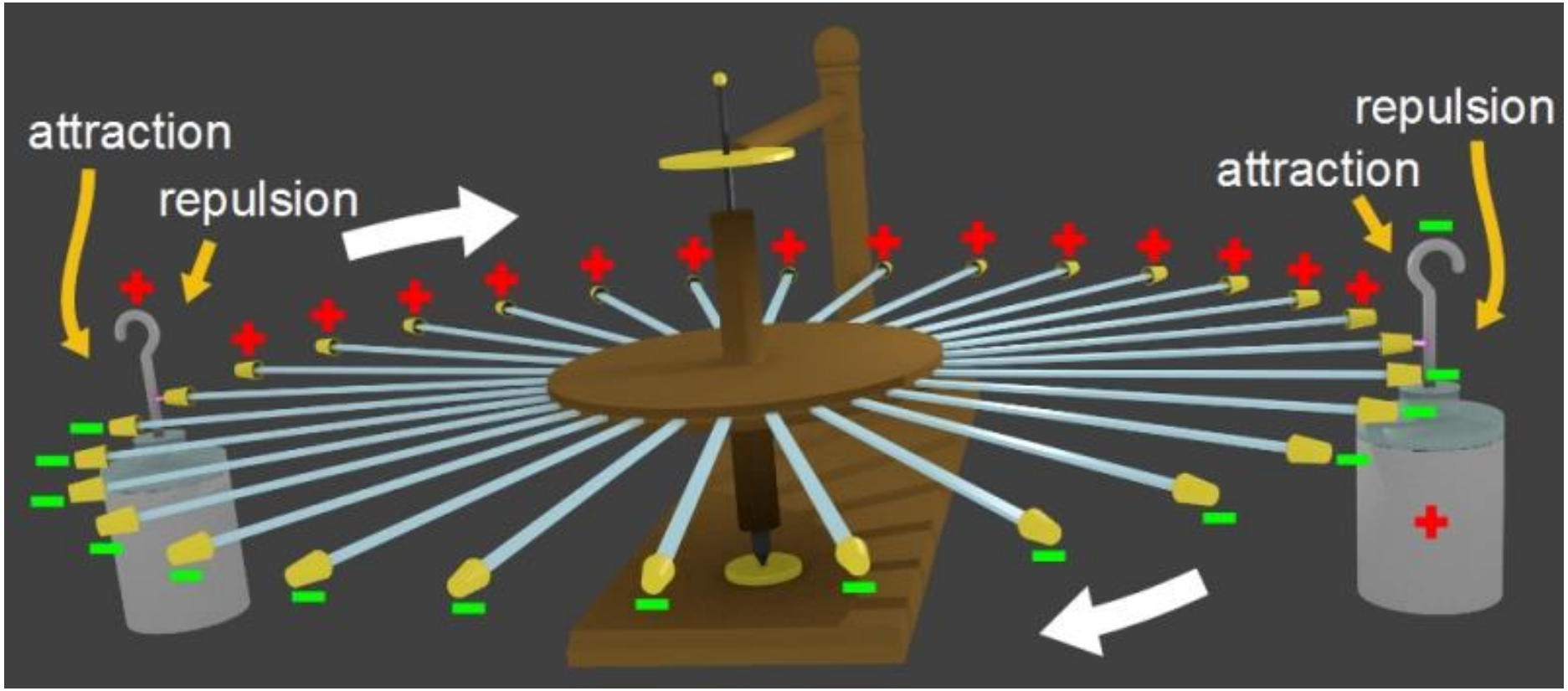
- **High Voltage circuits**
  - High voltage is applied to the stator and rotor to operate the motor.



Working principle of Electrostatic Motor

Working principle of Electrostatic Motor

- The operation of the electrostatic motor is based on the forces which electric fields exert on electric charges.
- High voltage is applied to the stator panel.
- Tiny spark jumps from the tip to each commutator brush to one of the electrode on the rotor.
- The electrode of the rotor is always attracted or repelled by the stator electrode.
- Electrostatic force cause the rotor to rotate.



Advantages, disadvantages and application of Electrostatic Motor

Application

- They can be made very small,
- They have good applications in MEMS(Microelectromechanical systems) devices where regular motors with coils would be too large, and where specific power (power per volume) is more important than the power itself.

Some MEMS devices

- accelerometers for airbag sensors,
- microphones,
- projection display chips,
- blood and tire pressure sensors,
- optical switches,
- analytical components such as lab-on-chip,
- biosensors and many other products.