SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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UNIT II: ELECTRIC PROPULSION UNIT

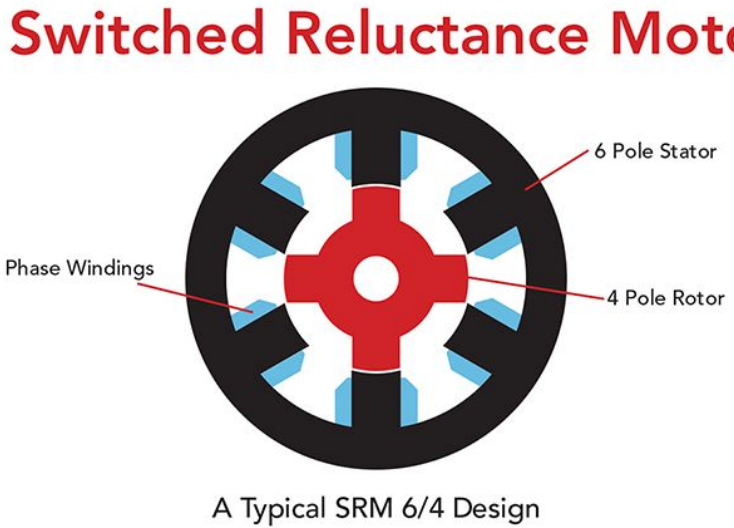
TOPIC: **Switched Reluctance Motor (SRM) Drives**

Introduction to SRMs

- **What is a Switched Reluctance Motor (SRM)?**
  - Electromechanical energy converter using reluctance torque.
  - Simple structure with salient poles on both stator and rotor.
- **Main Features:**
  - No permanent magnets or windings on the rotor.
  - Robust, cost-effective, and reliable.

Construction of SRMs

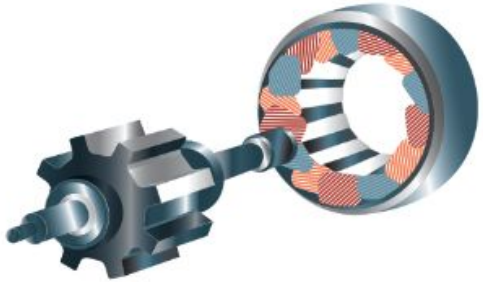
- **Stator and Rotor Structure:**
  - Stator with wound poles and coils.
  - Rotor made of laminated steel without windings.
- **Operation Principle:**
  - Sequentially energizing stator windings to create rotational movement.
- **Image / Diagram**: Show basic structure with labeled parts.



Working Principle of SRMs

- **Reluctance Torque:**
  - Rotor aligns with the lowest reluctance path when stator poles are energized.
- **Sequential Excitation:**
  - Stator poles are excited in a specific sequence to produce rotation.
- **Key Advantage:** Simple structure with high fault tolerance.

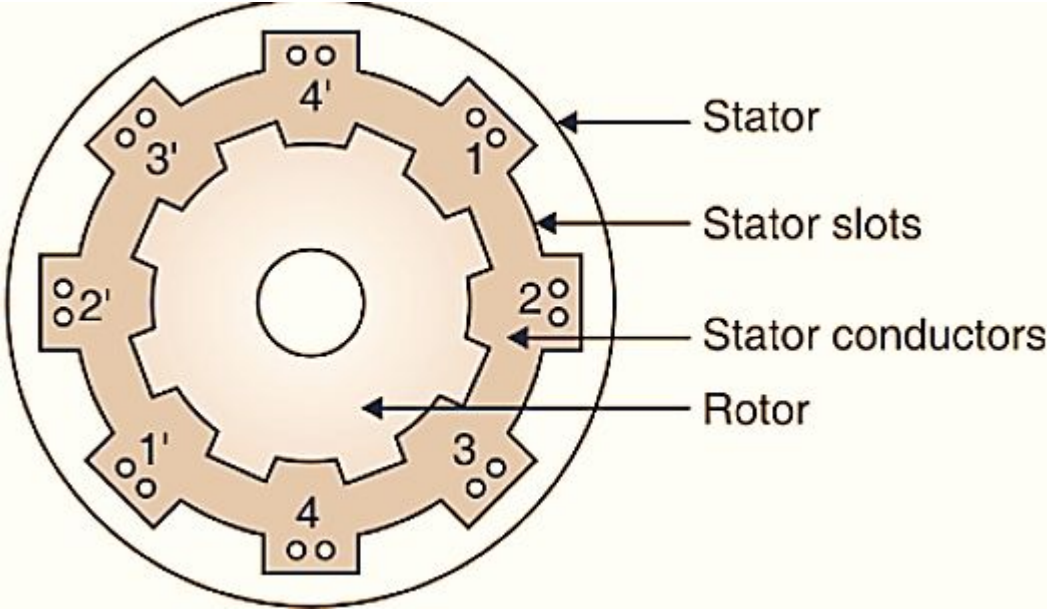
SRM Drive Circuitry



- **Power Electronics in SRM Drives:**
  - Explanation of how power electronic switches control the motor.
  - Need for converter circuits to switch currents for each phase.
- **Types of Converters Used:**
  - Asymmetric half-bridge converter.
  - C-dump converter and other configurations.

Control Methods for SRM Dri

- **Types of Control Strategies:**
  - Current Control.
  - Torque Control.
  - Position Control.
- **Challenges in Control:**
  - High torque ripple.
  - Complex control due to nc characteristics.



Advantages of SRMs

- **Durability and Robustness:**
  - No windings or magnets on the rotor, less prone to failure.
- **High Efficiency:**
  - Simple, efficient design with reduced copper losses.
- **Cost-Effectiveness:**
  - Lower cost compared to other motor types due to fewer components.
- **Suitability for High-Speed Applications:**
  - Ideal for applications requiring high speed and torque.

Disadvantages of SRMs

- **Torque Ripple and Noise:**
  - Higher torque ripple compared to other motors.
- **Complex Control Requirements:**
  - Needs precise control of phase switching.
- **Acoustic Noise:**
  - Tends to produce more noise, especially at higher speeds.

Applications of SRM Drives

- **Industrial Applications:**
  - Machine tools, conveyor systems.
- **Automotive Industry:**
  - Electric and hybrid vehicles.
- **Household Appliances:**
  - Washing machines, vacuum cleaners.
- **Aerospace Applications:**
  - High-speed systems, actuators.

Comparison with Other Motor Types

- **Comparison of SRMs with Induction Motors, DC Motors, and BLDC Motors:**
  - Efficiency, cost, reliability, control complexity, etc.
- **When SRMs are Preferable:**
  - Applications with high robustness requirements and cost constraints.

Future of SRM Technology

- **Trends in SRM Technology:**
  - Improved control strategies to reduce torque ripple.
  - Advances in material science for better performance.
- **Growing Application Fields:**
  - Increasing use in electric vehicles and renewable energy systems.

Summary and Conclusion

- **Recap of Key Points:**
  - Simple structure, robustness, and low cost make SRMs popular.
  - Complex control and noise are challenges but are being addressed.
- **Final Thoughts:**
  - SRMs are growing in popularity due to their unique advantages and suitability for various modern applications.

…THANK YOU