Fakulta strojní VŠB – TUO

Department of Control Systems and Instrumentation

Automatic Control Devices

2023

(Materials for write notes)

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Lecture No. 3

Actuators and their drives

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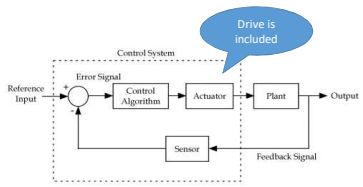
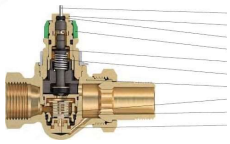
What do you find out?

- Actuators
- Drives, structure, management
  - DC motors
  - AC motors
  - Piezomotors
  - Coils, magnets
- ….

- **Action member** is …



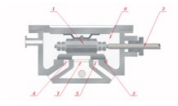
Media flow



- **Valve** - is



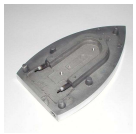
Media flow

- **Slide Valves**, is


Temperature





- **Heating coil –**
- .
  - … .
  - It usually includes

Air flow




- The active element

Use:

- … .

Rotational movement





- The action … .

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Linear motion

- For actuators implementing rectilinear movement,

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The angle of rotation

- Flap

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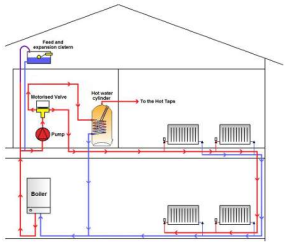
Use of drives for actuators in regulation



- An electric drive
- A heating coil
- Valves that
- …. .

Drives

- Drives can be divided according to the form of energy consumed as follows

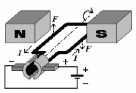
- Mechanical drives can perform two types of motion

Actuators (example depends on technology)

- **Regulators for controlling the flow of gases, air and liquids**
  - …
- **Temperature regulation**
  - …
- **Speed control**
  - …
- **Position regulation**
  - **…**

Drives

- **Electric drives**



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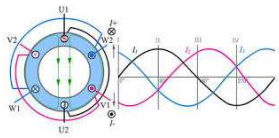
Drives

AC motors

- Single-phase motor
- Three-phase motor
  - synchronous motor
  - asynchronous motor



synchronous motor =

asynchronous motor =

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Asynchronous motors

The three-phase asynchronous motor is

A three-phase

The coils are usually located in the stator.

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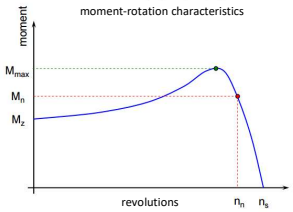
Asynchronous motors

moment-rotation characteristics



The phases (coils) of an asynchronous motor can be ...

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Asynchronous motors

We can control asynchronous motors:

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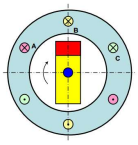
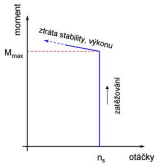
Synchronous motors

Three-phase synchronous motors are





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Single-phase commutator motors

The speed of an asynchronous motor is

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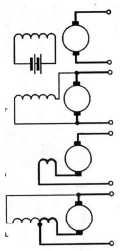
DC motors

According to the excitation, we distinguish:



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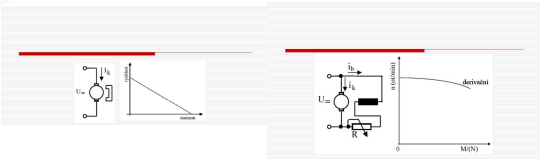
DC motors



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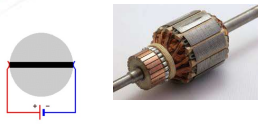
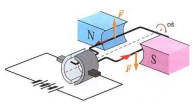
Commutator

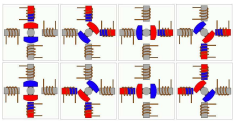
Commutator





Stepper motors

A **stepper motor** is a synchronous machine, usually

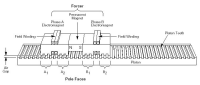


Advantages

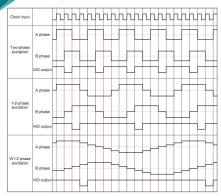
A disadvantage

Stepper motors

- **Passive Stepper Motors** –
- **Active stepper motors** –
- **Hybrid stepper motors** –
- **Linear stepper motors** –

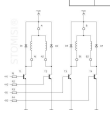


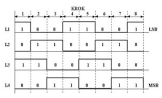
Stepper motors



A full step

Half-step





Micro Stepping

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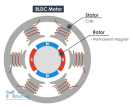
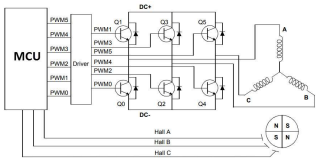
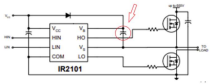
BLDC motor







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Servo drive

- **Servo**
  - **A servo motor,**

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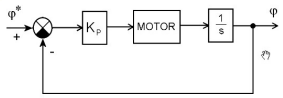
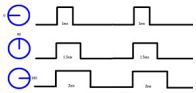
Servo drive

A servo motor,





The servo can be in motion:
Loosely

…

Restricted to a closed interval

…

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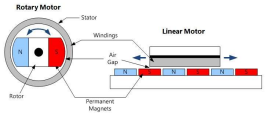
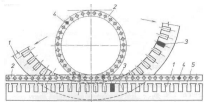
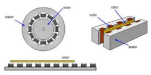
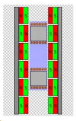
Linear motors





What is Linear Induction Motor?





Electrical 4 U

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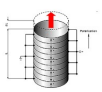
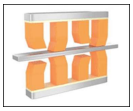
Piezoactuators

Piezoelectric phenomenon is





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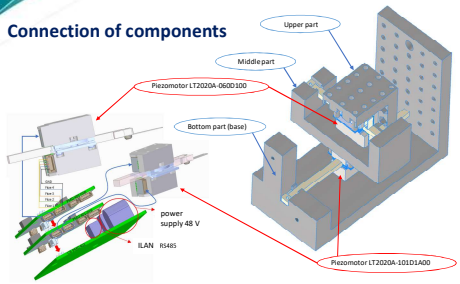
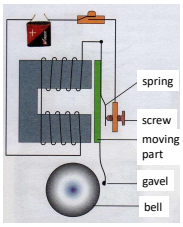
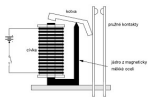
Connection of components



Electromagnets



An electromagnet



What was the content of the lecture

- Actuators
- Drives, structure, management
  - DC motors
  - AC motors
  - Piezomotors
  - Coils, magnets
- ….

Thank you for your attention …