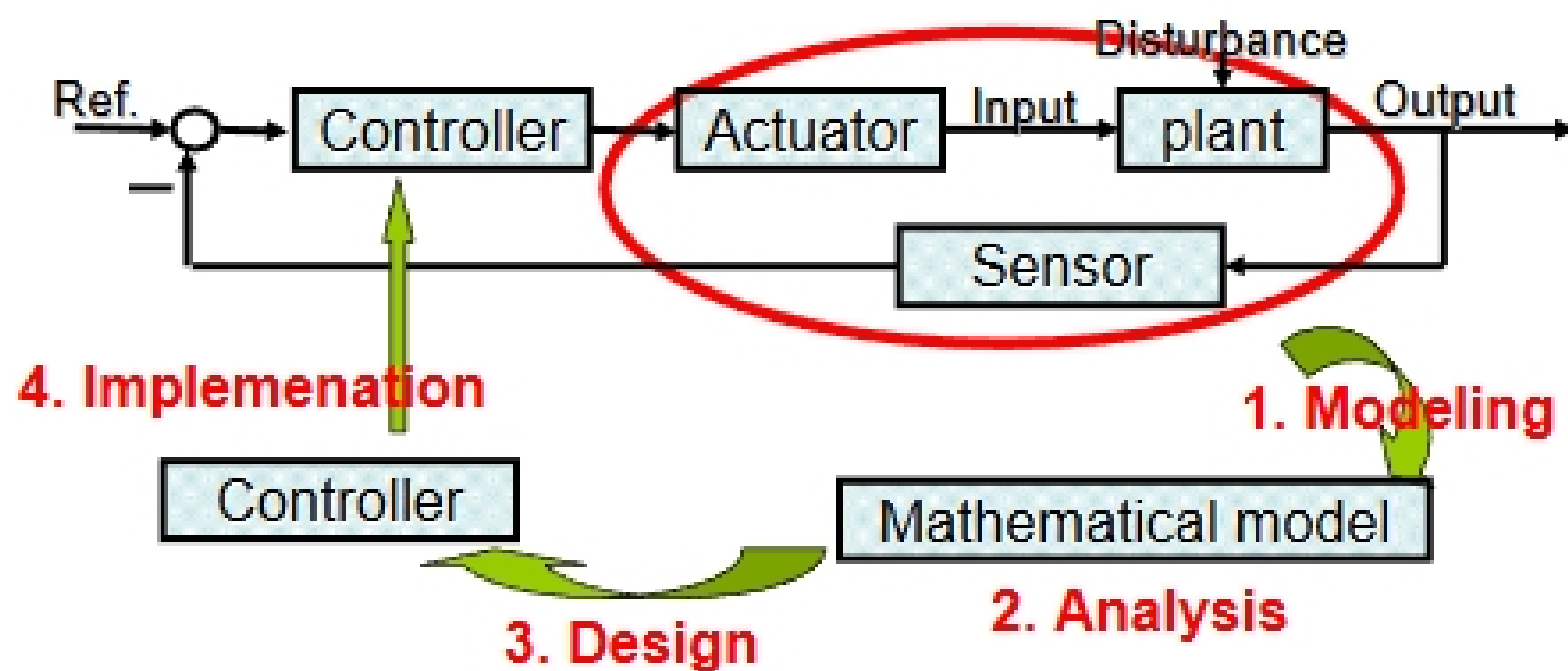




# Controller design procedure (review)



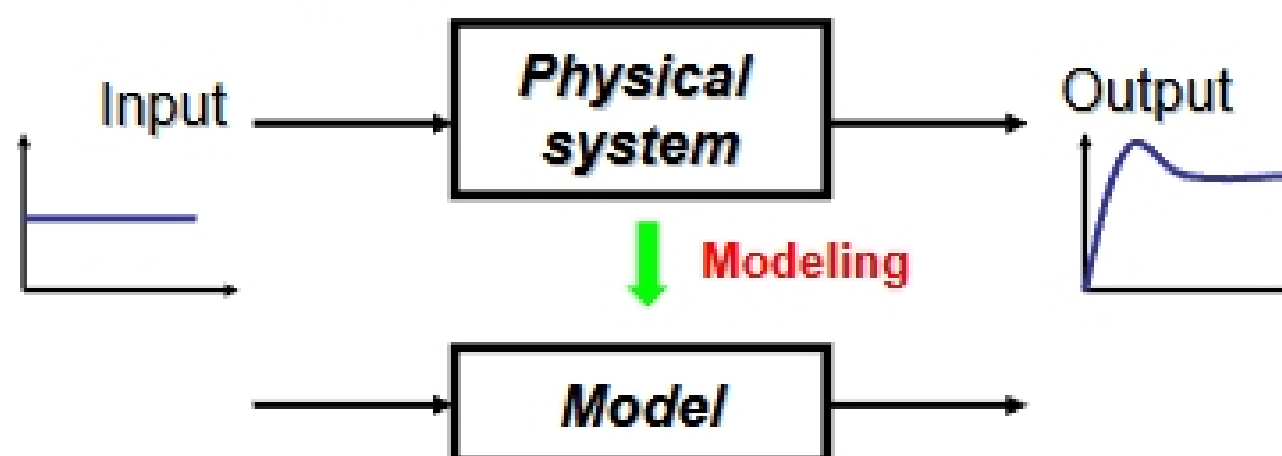
- What is the “mathematical model”?
- Transfer function
- Modeling of electrical circuits

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3

## Mathematical model

- Representation of the input-output (signal) relation of a physical system



- A model is used for the **analysis** and **design** of control systems.

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4

# Important remarks on models

- Modeling is the **most important and difficult task** in control system design.
- No mathematical model exactly represents a physical system.

Math model  $\neq$  Physical system

Math model  $\approx$  Physical system

- Do not confuse **models** with **physical systems**!
- In this course, we may use the term "**system**" to mean a mathematical model.

# Transfer function

- A transfer function is defined by

$$G(s) := \frac{Y(s)}{U(s)} \begin{array}{l} \leftarrow \text{Laplace transform of system output} \\ \leftarrow \text{Laplace transform of system input} \end{array}$$



- A system is assumed to be at rest. (Zero initial condition)