

# Introduction to Simulation and Modeling

By:

Tri Budi Santoso (Signal Processing Laboratory)

Achmad Basuki (Image Processing Laboratory)

Miftahul Huda (Signal Processing Laboratory)

EEPIS-ITS

**Speech Signal Processing**



# Background:

- Modeling and simulation has wide range
- Modeling and simulation has correlated with many disciplines, example is selected related on user background

## Purposes of this course are:

1. Introduce the basic technique of modeling and simulation such as Monte Carlo, Simulated Annealing and Soft Computing
1. Give some simple practical examples
2. Student could make implementation computer program for simulation

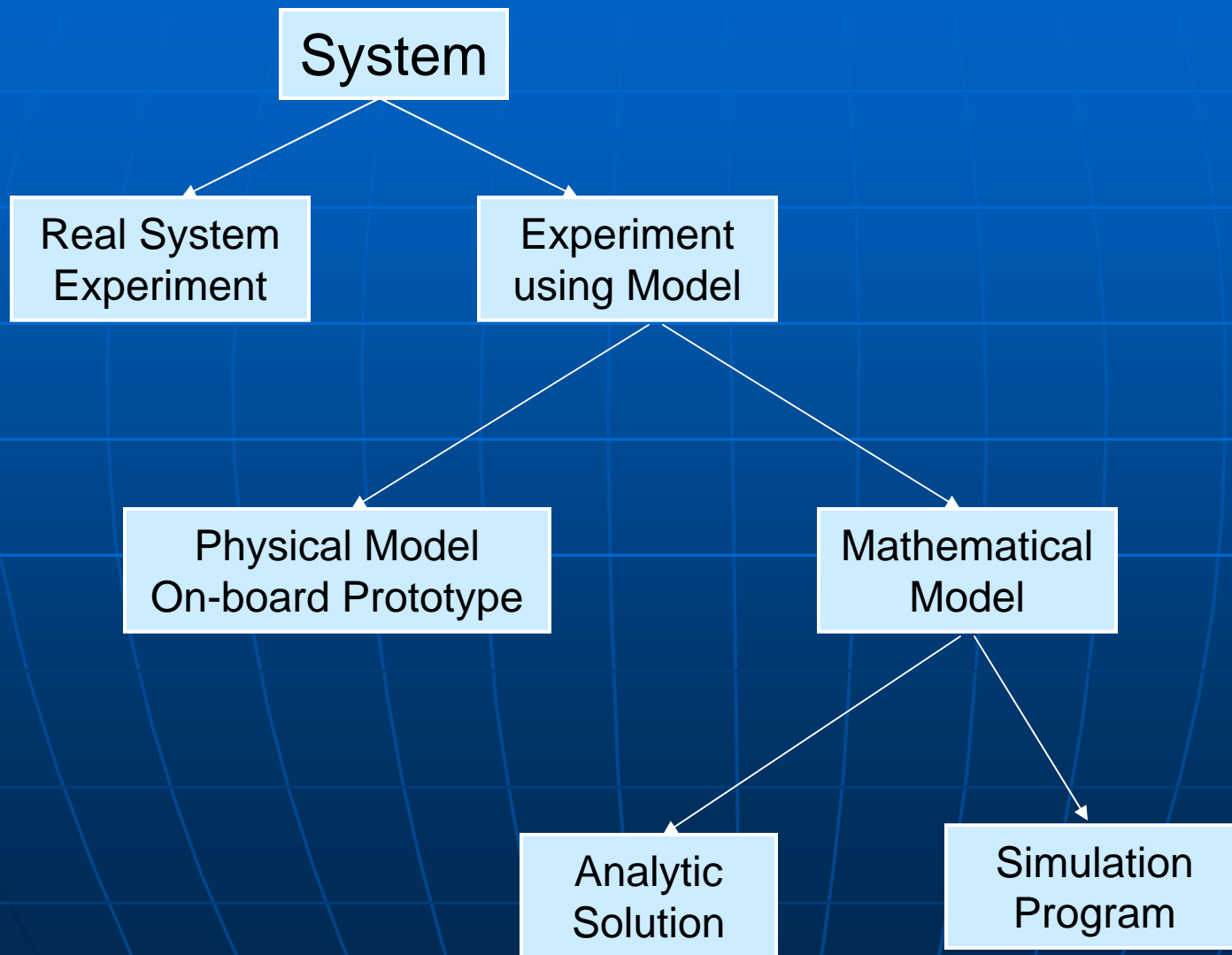
# Why need simulation?

- Problem is very difficult to be solved using analytic
- Problem is large and complex, no found exact solution
- Problem very expensive to applicable, like such of telecommunication problem
- Problems have some non-deterministic features or some conditions randomly constructed

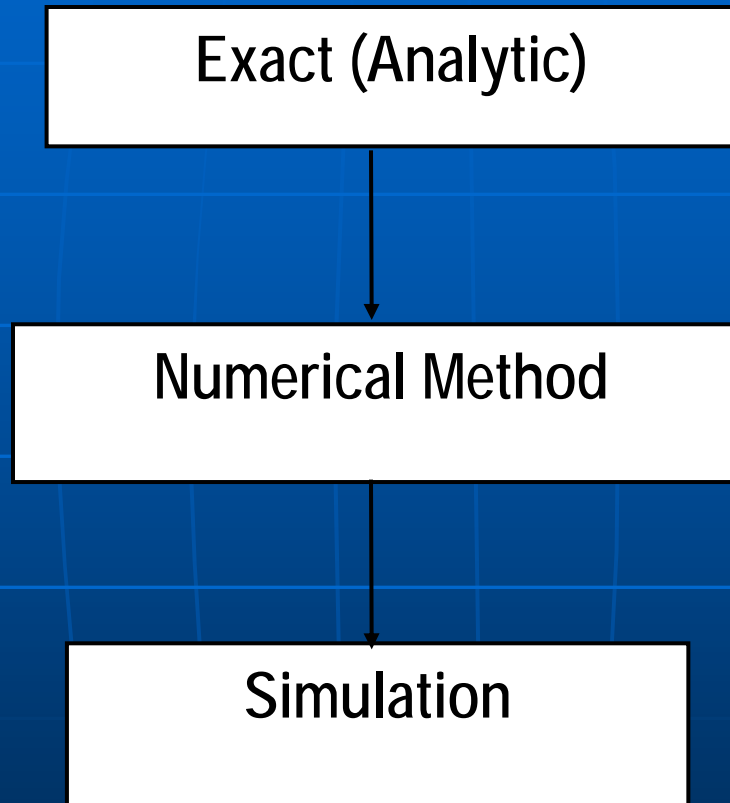
# Important Remark

- Simulation is one of tools to investigate properties of target systems
- Simulation results must be checked carefully by some methods; approximated solutions, limited case exact solution, qualitative analysis and simulation code itself
- Simulation programs must be coded neatly with good programming style

# System Learning



# Problem solving:



# Workshop I

- Bangkitkan Sinyal Sinus yang memiliki bentuk persamaan seperti berikut :  
 $x(t) = 10 \sin 2\pi ft/T$  dimana  $f = 2$ ,  $T = 10$ , dan  $t$  bernilai  $0 \leq t \leq 200$
- Jumlahkan Sinyal Sinus 1 dengan Sinyal Sinus 2  
 $x_1(t) = \sin 2\pi f_1 t/T$  dimana  $f_1 = 2$ ,  $T = 20$ , dan  $t$  bernilai  $0 \leq t \leq 200$   
 $x_2(t) = 0,5 \sin 2\pi f_2 t/T$  dimana  $f_2 = 6$ ,  $T = 20$ , dan  $t$  bernilai  $0 \leq t \leq 200$
- Kalikan Sinyal Sinus 1 dengan Sinyal Sinus 2  
 $x_1(t) = \sin 2\pi f_1 t/T$  dimana  $f_1 = 2$ ,  $T = 20$ , dan  $t$  bernilai  $0 \leq t \leq 200$   
 $x_2(t) = 0,5 \sin 2\pi f_2 t/T$  dimana  $f_2 = 6$ ,  $T = 20$ , dan  $t$  bernilai  $0 \leq t \leq 200$

1. Bangkitkan Sinyal Sinus yang memiliki bentuk persamaan seperti berikut :

$$x(t) = 10 \sin 2\pi ft/T \text{ dimana } f = 2, T=10, \text{ dan } t \text{ bernilai } 0 \leq t \leq 199$$

2. Bangkitkan sebuah sinyal bernilai acak sebanyak 200 dalam hal ini anda bisa gunakan perintah `(double)rand()`

3. Jumlahkan hasil pembangkitan nomor (1) dengan hasil dari nomor (2)