國立臺灣海洋大學河海工程學系1997 工程數學（三）第九次作業

1. In the course, we have solved the particular solution (steady state solution) of the SDOF vibration system

$$\ddot{x} + x = cos(3t)$$

$$\ddot{x} + x = sin(3t)$$

(1). conventional method.

(2). method of complex variables.

(3). Discuss the change of amplitude and phase between input and output and plot it in complex plane.

(Hint: by superimposing real and imaginary part)

2. Solve the particular solution (steady state solution) of the SDOF vibration system

$$\ddot{x} + \dot{x} + x = cos(3t)$$

$$\ddot{x} + \dot{x} + x = sin(3t)$$

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(Hint: by superimposing real and imaginary part)

3. Solve the particular solution (steady state solution) of the SDOF vibration system

$$\ddot{x} + \dot{x} + x = cos(3t)$$

$$\ddot{x} + \dot{x} + x = sin(3t)$$

(1). check the phase of $x_p(t) = a\,cos(3t) + b\,sin(3t) = c\,cos(3t + \phi)$

(2). check the phase of $x_p(t) = p\,cos(3t) + q\,sin(3t) = r\,sin(3t + \psi)$

(3). check the pahse of $z = R\,e^{i\theta}\,e^{i\omega t}$

(4). What is the relation of c, r and R ?

(5). What is the relation of ϕ, ψ and θ ?