國立臺灣海洋大學河海工程學系1997 工程數學(三) 第八次作業

1. Solve the particular solution (steady state solution) of the SDOF vibration system $\ddot{x} + 2\xi\omega\dot{x} + \omega^2 x = sin(\bar{\omega}t)$ by

(1). conventional method.(5 %)

(2). method of complex variables.(10 %)

(3). Reformulate the solution in terms of $x(t) = \rho\ sin(\bar{\omega}t + \phi)$.(10 %)

(4). Discuss the change of amplitude and phase between input and output.(10 %)

(5). Plot the amplitude change and phase in the complex plane.(10 %)

(6). If $\xi = 0$, what is the phase lag ϕ ?(10 %)

(7). Solve $x(t)$, if $\bar{\omega} = \omega$ and $\xi \neq 0$?(10 %)

(8). Solve $x(t)$, if $\bar{\omega} = \omega$ and $\xi = 0$?(10 %)

(Hint: by superimposing the complementary solution before taking limit)