Engineering Mathematics(III)

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due 14/11 morning, Fall 1994, J. T. Chen

HW No.4

Solve the particular solution (steady state solution) of the SDOF vibration system $\ddot{x} + \omega^2 x = cos(\bar{\omega}t)$ when $\omega = \bar{\omega}$

(1). Can the solution be derived by limiting process of $\bar{\omega} \to \omega$? (Hint: by superimposing the complementary solution before taking limit)

HW No.5

Solve the following Laplace equation in polar coordinate system.

Governing equation:

$$\nabla^2 u(r, \theta) = 0, 0.5 < r < 1$$

Boundary condition:

$$u(1, \theta) = 0, \quad u(0.5, \theta) = cos^2(\theta)$$

HW No.6

If u, v are harmonic functions in region R, then prove $(\frac{\partial u}{\partial y} - \frac{\partial v}{\partial x}) + i(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y})$ is analytic in R.

HW No.7

In class, we derive the Cauchy-Riemann equations by two paths

case.1 : $\Delta x \neq 0, \Delta y = 0$

case.2 : $\Delta x = 0, \Delta y \neq 0$

Now consider the two paths in n and $\bar{n}$ directions

case.3 : $\Delta x = \epsilon\ cos(\theta), \Delta y = \epsilon\ sin(\theta)$ in n direction

case.4 : $\Delta x = \epsilon\ sin(\theta), \Delta y = -\epsilon\ cos(\theta)$ in $\bar{n}$ direction

Derive the new Cauchy-Riemann equations in the two directions. Can the new equations be derived from the classical Cauchy-Riemann equations. Reduce to classical Cauchy-Riemann equations by putting $\theta = 0$. (Hint: using the normal derivative)

【存檔：E:/ctex/course/math3/94hw3.te】【建檔:Oct./25/'94】