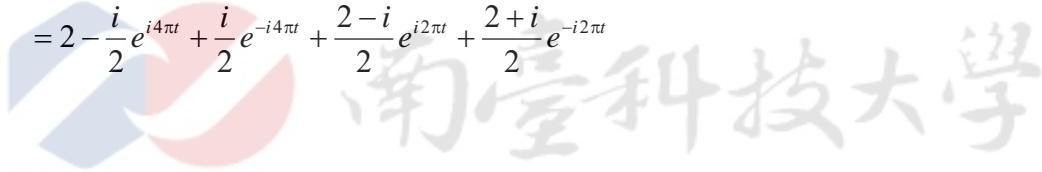


週期函數 $x(t) = 2\sin 3\pi t \cos \pi t + 4\cos^2 \pi t$ ，試寫出 $x(t)$ 的複指數傅立葉級數(Complex Fourier series)。[102 虎尾飛機乙 4]

$$\begin{aligned} \text{[解]} x(t) &= \sin 4\pi t + \sin 2\pi t + 2(1 + \cos 2\pi t) = \frac{e^{i4\pi t} - e^{-i4\pi t}}{2i} + \frac{e^{i2\pi t} - e^{-i2\pi t}}{2i} + 2\left(1 + \frac{e^{i2\pi t} + e^{-i2\pi t}}{2}\right) \\ &= -i \frac{e^{i4\pi t} - e^{-i4\pi t}}{2} - i \frac{e^{i2\pi t} - e^{-i2\pi t}}{2} + 2 + e^{i2\pi t} + e^{-i2\pi t} \\ &= 2 - \frac{i}{2} e^{i4\pi t} + \frac{i}{2} e^{-i4\pi t} + \frac{2-i}{2} e^{i2\pi t} + \frac{2+i}{2} e^{-i2\pi t} \end{aligned}$$



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