

$$u(x,t) = \int_0^\infty \left(A \frac{e^{i\omega x} + e^{-i\omega x}}{2} + B \frac{e^{i\omega x} - e^{-i\omega x}}{2i} \right) d\omega$$

$$= \int_0^\infty_{\omega \geq 0} + \int_0^\infty_{\omega < 0} = \int_0^\infty C e^{i\omega x} d\omega + \int_0^\infty D e^{-i\omega x} d\omega$$

$$\begin{cases} \omega = \Omega \\ d\omega = d\Omega \end{cases} \quad \begin{cases} \omega = -\Omega \\ d\omega = -d\Omega \end{cases}$$

$$= \int_0^\infty C e^{i\Omega x} d\Omega + \int_0^\infty D(-\Omega) e^{i\Omega x} (-d\Omega) = \int_0^\infty C e^{i\Omega x} d\Omega + \int_\infty^0 D(-\Omega) e^{i\Omega x} d\Omega = \int_{-\infty}^\infty E(\Omega) e^{i\Omega x} d\Omega$$

$$T = e^{-i\omega t}$$

$$X = e^{i\omega x}$$

$$\omega = \omega' - \omega''$$

$$\lambda = \omega' \geq 0$$