

$$\begin{aligned}
s(x, y, z) &= \int s(x, y, z, \omega) d\omega \\
&= \int \left( \int \int s(x', y', z = 0, \omega) e^{-j \frac{2\omega}{c} \|x' - x, y' - y, z\|} dx' dy' \right) d\omega
\end{aligned}$$

$$\begin{aligned}
S(k_x, k_y, z) &= \int S(k_x, k_y, z = 0, \omega) e^{-jk_z z} d\omega \\
&= \int S(k_x, k_y, z = 0, k_z) e^{-jk_z z} dk_z \\
&= \text{IFT}_{k_z} \{ S(k_x, k_y, z = 0, k_z) e^{-jk_z z_0} \}
\end{aligned}$$

$$s(x, y, z) = \text{IFT}_{k_x, k_y} \{ \text{IFT}_{k_z} \{ \text{Stolt} \{ \text{FT}_{x, y} \{ s(x', y', z = 0, \omega) \} \} e^{-jk_z z_0} \} \}.$$