Note that the angular frequency "spikes" in the above figure at $\omega' = \omega$ associated with the real and imaginary components of the complex ***frequency-domain*** amplitude $\tilde{V}_{p\text{-}mic}(\vec{r},\omega_o)$ are in fact 1-D ***delta-functions*** {in angular-frequency space}, which can be mathematically represented as $V_o^{p\text{-}mic}(\vec{r},\omega_o)\cos\varphi_p(\vec{r},\omega_o)\cdot\delta(\omega_o-\omega)$ and $V_o^{p\text{-}mic}(\vec{r},\omega_o)\sin\varphi_p(\vec{r},\omega_o)\cdot\delta(\omega_o-\omega)$, respectively. Note one of the many interesting/intriguing properties of the 1-D delta function: Since $\omega = 2\pi f$, hence $d\omega = 2\pi df$, and thus:

$$\int_{-\infty}^{+\infty}\delta(\omega_o-\omega)\,d\omega = \int_{-\infty}^{+\infty}\delta(2\pi f_o - 2\pi f)\cdot 2\pi df = \int_{-\infty}^{+\infty}\delta\big[2\pi(f_o-f)\big]\cdot 2\pi df$$
$$= \int_{-\infty}^{+\infty}\tfrac{1}{|2\pi|}\delta(f_o-f)\cdot 2\pi df = \int_{-\infty}^{+\infty}\tfrac{1}{\cancel{2\pi}}\delta(f_o-f)\cdot \cancel{2\pi} df = \int_{-\infty}^{+\infty}\delta(f_o-f)\,df = 1$$

Note further that the 1-D delta function $\delta(\omega_o-\omega)$ has physical units of ***inverse*** angular frequency, $\omega^{-1} = 1/\omega$ (*i.e.* sec/radian) and that the 1-D delta function $\delta(f_o-f)$ has physical units of ***inverse*** frequency, $f^{-1} = 1/f$ (*i.e.* seconds), since the 1-D integrals $\int_{-\infty}^{+\infty}\delta(\omega_o-\omega)\,d\omega = 1$ and $\int_{-\infty}^{+\infty}\delta(f_o-f)\,df$ are both dimensionless…

The above complex ***frequency-domain*** result(s) should be compared with their complex ***time-domain*** counterparts:

$$\tilde{V}_{p\text{-}mic}(\vec{r},t) = V_o^{p\text{-}mic}(\vec{r},\omega_o)e^{i(\omega_o t+\varphi_p(\vec{r},\omega_o))} = V_o^{p\text{-}mic}(\vec{r},\omega_o)e^{i\varphi_p(\vec{r},\omega_o)}\cdot e^{i\omega_o t}$$
$$= V_o^{p\text{-}mic}(\vec{r},\omega_o)\Big\{\cos\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big) + i\sin\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big)\Big\}$$

$$X(t) \equiv \mathrm{Re}\Big\{\tilde{V}_{p\text{-}mic}(\vec{r},t)\Big\} = \mathrm{Re}\Big\{V_o^{p\text{-}mic}(\vec{r},\omega_o)e^{i(\omega_o t+\varphi_p(\vec{r},\omega_o))}\Big\} = V_o^{p\text{-}mic}(\vec{r},\omega_o)\,\mathrm{Re}\Big\{e^{i(\omega_o t+\varphi_p(\vec{r},\omega_o))}\Big\}$$
$$= V_o^{p\text{-}mic}(\vec{r},\omega_o)\,\mathrm{Re}\Big\{\cos\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big) + \cancel{i\sin\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big)}\Big\}$$
$$= V_o^{p\text{-}mic}(\vec{r},\omega_o)\cos\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big)$$

$$Y(t) \equiv \mathrm{Im}\Big\{\tilde{V}_{p\text{-}mic}(\vec{r},t)\Big\} = \mathrm{Im}\Big\{V_o^{p\text{-}mic}(\vec{r},\omega_o)e^{i(\omega_o t+\varphi_p(\vec{r},\omega_o))}\Big\} = V_o^{p\text{-}mic}(\vec{r},\omega_o)\,\mathrm{Im}\Big\{e^{i(\omega_o t+\varphi_p(\vec{r},\omega_o))}\Big\}$$
$$= V_o^{p\text{-}mic}(\vec{r},\omega_o)\,\mathrm{Im}\Big\{\cancel{\cos\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big)} + i\sin\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big)\Big\}$$
$$= V_o^{p\text{-}mic}(\vec{r},\omega_o)\sin\big(\omega_o t+\varphi_p(\vec{r},\omega_o)\big)$$

As mentioned above, the ***frequency-domain*** counterparts of complex ***time-domain*** quantities such as $\tilde{V}_{FG}(t) = V_o^{FG}e^{i\omega_o t}$ and $\tilde{V}_{p\text{-}mic}(\vec{r},t) = V_o^{p\text{-}mic}(\vec{r},\omega_o)e^{i(\omega_o t+\varphi_p(\vec{r},\omega_o))}$ are obtained by taking the ***Fourier transform*** of the ***time-domain*** quantities, and vice-versa.