Note further that when the {absolute value} of $\mathrm{Re}\left\{\tilde{\gamma}_{u_k \star p}(\omega)\right\} \simeq 1$, the k^{th} component of a polyphonic complex sound field $\tilde{S}(\vec{r},t;\omega)$ is ***fully***-***coherent***, .and. is one that is associated with ***propagating*** sound radiation, *e.g*. when a listener's position is far from a point sound source, in the so-called ***far***-***field*** region of a sound source, $r \gg \lambda$.

However, when the {absolute value} of $\mathrm{Im}\left\{\tilde{\gamma}_{u_k \star p}(\omega)\right\} \simeq 1$ the k^{th} component of a polyphonic complex sound field $\tilde{S}(\vec{r},t;\omega)$ is {also} ***fully***-***coherent***, but is instead associated with ***non-propagating*** sound radiation – *i*.e. acoustic energy that is simply sloshing back and forth locally at the listener's point *r* during each cycle of oscillation, *e.g*. in the so-called ***near***-***field*** region of a sound source, $r \ll \lambda$.

Thus, *e.g*. simultaneously exciting the 3 acoustic standing waves associated with the [1,0,0]/[0,1,0]/[0,0,1] axial modes of a cubical 3-D enclosure of side $d = \lambda/2$, with 3-fold degenerate modal frequency $f_{res} \equiv f_{100} = f_{010} = f_{001} = c/2d$, we see that $\mathrm{Re}\left\{\tilde{\gamma}_{u_k \star p}(\omega_{res})\right\} \simeq 0$ and $\mathrm{Im}\left\{\tilde{\gamma}_{u_k \star p}(\omega_{res})\right\} \simeq 1$ for each of the *k* = *x*, *y*, *z* components of this complex sound field.

We can additionally define the corresponding *k* = *x*, *y*, *z* vector components of the ***magnitude-squared*** version of the ***frequency-domain*** ***sound*** ***field*** ***coherence*** ***function*** $\left|\vec{\tilde{\gamma}}_{u\star p}(\omega)\right|^2$ {*n.b*. a purely ***real*** quantity}, as:

$$\left|\vec{\tilde{\gamma}}_{u\star p}(\omega)\right|^2 \equiv \vec{\tilde{\gamma}}_{u\star p}(\omega)\cdot\vec{\tilde{\gamma}}^{*}_{u\star p}(\omega) = \frac{\left|\vec{\tilde{S}}_{u\star p}(\omega)\right|^2}{\tilde{S}_{p\star p}(\omega)\cdot\tilde{S}_{u_k\star u_k}(\omega)} = \frac{\left|\vec{\tilde{G}}_{u\star p}(\omega)\right|^2}{\tilde{G}_{p\star p}(\omega)\cdot\tilde{G}_{u_k\star u_k}(\omega)}$$

where:

$$\left|\vec{\tilde{\gamma}}_{u\star p}(\omega)\right|^2 = \left|\tilde{\gamma}_{u_x\star p}(\omega)\right|^2 + \left|\tilde{\gamma}_{u_y\star p}(\omega)\right|^2 + \left|\tilde{\gamma}_{u_y\star p}(\omega)\right|^2$$

The individual *k* = *x*, *y*, *z* components of the ***frequency***-***domain*** the ***magnitude***-***squared*** coherence function $\left|\vec{\tilde{\gamma}}_{u\star p}(\omega)\right|^2$ can range from $0 \le \left|\tilde{\gamma}_{u_k\star p}(\omega)\right|^2 \le 1$. When $\left|\tilde{\gamma}_{u_k\star p}(\omega)\right|^2 \simeq 1$, a polyphonic complex sound field $\tilde{S}(\vec{r},t;\omega)$ is ***fully***-***coherent*** (*e.g*. at a listener's position some distance away from a single sound source), whereas when $\left|\tilde{\gamma}_{u_k\star p}(\omega)\right|^2 \simeq 0$, the polyphonic complex sound field is ***completely*** ***incoherent*** (*e.g*. at a listener's position deep inside the ***reverberant*** portion of a polyphonic complex sound field $\tilde{S}(\vec{r},t;\omega)$ associated with a large listening room and/or auditorium, concert hall, *etc*.).

It can also be seen from the above discussion(s) that the complex 3-D vector coherence function $\vec{\tilde{\gamma}}_{u_k\star p}(\omega)$ contains more information (real and imaginary components) and is thus more useful than its purely-real, magnitude-squared version $\left|\vec{\tilde{\gamma}}_{u\star p}(\omega)\right|^2$.