The ***phase*** of the complex longitudinal ***specific*** acoustic impedance and longitudinal energy flow velocity associated with the two counter-propagating 1-D monochromatic plane waves is:

$$\varphi_{z_{a\,tot}}(x) \equiv \tan^{-1}\left(\frac{\mathrm{Im}\{\tilde{z}^{\parallel}_{a\,tot}(x)\}}{\mathrm{Re}\{\tilde{z}^{\parallel}_{a\,tot}(x)\}}\right) = \tan^{-1}\left(\frac{\cancel{z_o}\left[2|\tilde{R}|\sin(2kx+\Delta\varphi^o_{BA}) \Big/ \cancel{\left[\{1+|\tilde{R}|^2\}-2|\tilde{R}|\cos(2kx+\Delta\varphi^o_{BA})\right]}\right]}{\cancel{z_o}\left[\{1-|\tilde{R}|^2\} \Big/ \cancel{\left[\{1+|\tilde{R}|^2\}-2|\tilde{R}|\cos(2kx+\Delta\varphi^o_{BA})\right]}\right]}\right)$$

$$= \tan^{-1}\left(\frac{2|\tilde{R}|\sin(2kx+\Delta\varphi^o_{BA})}{\{1-|\tilde{R}|^2\}}\right) = \Delta\varphi_{p_{tot}-u^{\parallel}_{tot}}(x) = \varphi_{p_{tot}}(x) - \varphi_{u^{\parallel}_{tot}}(x) = \varphi_{c_{a\,tot}}(x)$$

Thus, *e.g.* for an observer/listener's position $x = 0$, **.and.** for ***equal-strength*** pressure amplitudes $|\tilde{A}| = |\tilde{B}| \;\Rightarrow\; |\tilde{R}| \equiv |\tilde{B}|/|\tilde{A}| = 1$ (*i.e.* a "***pure***" standing wave) these two formulae simplify to:

$$\tilde{z}^{\parallel}_{a\,tot}(x=0) = z_o\frac{i\sin\Delta\varphi^o_{BA}}{[1-\cos\Delta\varphi^o_{BA}]}, \text{ or: } \tilde{c}^{\parallel}_{a\,tot}(x=0) = c\frac{i\sin\Delta\varphi^o_{BA}}{[1-\cos\Delta\varphi^o_{BA}]}$$

and:

$$\varphi_{z_a}(x=0) = \varphi_{c_a}(x=0) = \tan^{-1}\left(\frac{2\sin\Delta\varphi^o_{BA}}{0}\right) = \tan^{-1}(\pm\infty)$$

$$= \Delta\varphi_{p_{tot}-u_{tot}}(x=0) = \varphi_{p_{tot}}(x=0) - \varphi_{u_{tot}}(x=0)$$

$$= \pm\pi/2, \pm 3\pi/2, \pm 5\pi/2, ... \;= \pm n_{odd}\,\pi/2$$

i.e. for an observer/listener's position $x = 0$, **.and.** for ***equal-strength*** pressure amplitudes $|\tilde{A}| = |\tilde{B}|$ $\Rightarrow |\tilde{R}| \equiv |\tilde{B}|/|\tilde{A}| = 1$ the complex longitudinal ***specific*** acoustic impedance $\tilde{z}^{\parallel}_{tot}(x=0)$ is ***purely imaginary***; its phase $\varphi_z(x=0)$ is an ***odd*** integer multiple of $\pm\pi/2 = \pm 90^{\mathrm{o}}$ – which in turn also tells us that in this situation, the complex pressure $\tilde{p}_{tot}(x=0,t)$ and longitudinal particle velocity $\tilde{u}^{\parallel}_{tot}(x=0,t)$ differ in phase by an ***odd*** integer multiple of $\pm\pi/2 = \pm 90^{\mathrm{o}}$.

Note that in general, for arbitrary values of x, ***maxima*** of the complex longitudinal ***specific*** acoustic impedance $\tilde{z}^{\parallel}_{tot}(x)$ occur whenever $(2kx+\Delta\varphi^o_{BA}) = 0, \pm 2\pi, \pm 4\pi, \pm 6\pi ... = \pm n_{even}\pi$, *i.e.* whenever $\cos(2kx+\Delta\varphi^o_{BA}) = +1$, and thus $\sin(2kx+\Delta\varphi^o_{BA}) = 0$, then:

$$\frac{|\tilde{z}^{\parallel}_{a\,tot}(x)|_{\text{maxima}}}{z_o} = \frac{\sqrt{\{1-|\tilde{R}|^2\}^2 + 4|\tilde{R}|^2\sin^2(2kx+\Delta\varphi^o_{BA})}}{\left[\{1+|\tilde{R}|^2\}-2|\tilde{R}|\cos(2kx+\Delta\varphi^o_{BA})\right]} = \frac{\sqrt{\{1-|\tilde{R}|^2\}^2}}{\left[\{1+|\tilde{R}|^2\}-2|\tilde{R}|\right]}$$

$$= \left(\frac{1-|\tilde{R}|^2}{1-2|\tilde{R}|+|\tilde{R}|^2}\right) = \left(\frac{1-|\tilde{R}|^2}{(1-|\tilde{R}|)^2}\right) = \frac{\cancel{(1-|\tilde{R}|)}\cdot(1+|\tilde{R}|)}{\cancel{(1-|\tilde{R}|)}\cdot(1-|\tilde{R}|)} = \frac{(1+|\tilde{R}|)}{(1-|\tilde{R}|)} = \frac{|\tilde{c}^{\parallel}_{a\,tot}(x)|_{\text{maxima}}}{c}$$