The ***instantaneous*** potential, kinetic and total energy densities (*n.b.* ***always purely real, additive quantities***!) associated with two counter-propagating 1-D monochromatic traveling plane waves are:

$$w_{potl}^{inst}(x,t) \equiv \frac{1}{2}\frac{1}{\rho_o c^2} p_{tot}^2(x,t) \qquad = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\left(\omega t - kx + \varphi_A^o\right) + |\tilde{R}|\cos\left(\omega t + kx + \varphi_B^o\right)\right]^2$$

$$= \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos^2\left(\omega t - kx + \varphi_A^o\right) + 2|\tilde{R}|\cos\left(\omega t - kx + \varphi_A^o\right)\cos\left(\omega t + kx + \varphi_B^o\right) + |\tilde{R}|^2\cos^2\left(\omega t + kx + \varphi_B^o\right)\right]$$

$$w_{kin}^{inst}(x,t) \equiv \frac{1}{2}\rho_o \vec{u}_{tot}^{\parallel}(x,t) \bullet \vec{u}_{tot}^{\parallel}(x,t) = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\left(\omega t - kx + \varphi_A^o\right) - |\tilde{R}|\cos\left(\omega t + kx + \varphi_B^o\right)\right]^2$$

$$= \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos^2\left(\omega t - kx + \varphi_A^o\right) - 2|\tilde{R}|\cos\left(\omega t - kx + \varphi_A^o\right)\cos\left(\omega t + kx + \varphi_B^o\right) + |\tilde{R}|^2\cos^2\left(\omega t + kx + \varphi_B^o\right)\right]$$

$$w_{tot}^{inst}(x,t) \equiv w_{potl}^{inst}(x,t) + w_{kin}^{inst}(x,t) = \frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos^2\left(\omega t - kx + \varphi_A^o\right) + |\tilde{R}|^2\cos^2\left(\omega t + kx + \varphi_B^o\right)\right]$$

Again, for an observer/listener's position at $x = 0$ **.and.** $|\tilde{R}| = 1$ (*i.e.* a "***pure***" standing wave), these quantities reduce to:

$$w_{potl}^{inst}(x=0,t) = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\omega t + \cos\left(\omega t + \Delta\varphi_{BA}^o\right)\right]^2$$

$$w_{kin}^{inst}(x=0,t) = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\omega t - \cos\left(\omega t + \Delta\varphi_{BA}^o\right)\right]^2$$

$$w_{tot}^{inst}(x,t) \equiv w_{potl}^{inst}(x,t) + w_{kin}^{inst}(x,t) = \frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos^2\omega t + |\tilde{R}|^2\cos^2\left(\omega t + \Delta\varphi_{BA}^o\right)\right]$$

We see that when: $\Delta\varphi_{BA}^o = 0, \pm 2\pi, \pm 4\pi, \pm 6\pi, \ldots = \pm n_{even}\pi$

since: $\cos\left(\theta \pm n_{even}\pi\right) = \left(\cos\theta \cdot \cos n_{even}\pi\right) \mp \left(\sin\theta \cdot \sin n_{even}\pi\right) = \cos\theta$, the ***total*** energy density is ***all*** in the form of ***potential*** energy density:

$$w_{potl}^{inst}(x=0,t) = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\omega t + \cos\left(\omega t \pm n_{even}\pi\right)\right]^2 = \frac{1}{2}\frac{4|\tilde{A}|^2}{\rho_o c^2}\cos^2\omega t = \frac{2|\tilde{A}|^2}{\rho_o c^2}\cos^2\omega t = \frac{2|\tilde{A}|^2}{z_o c}\cos^2\omega t$$

$$w_{kin}^{inst}(x=0,t) = \frac{1}{2}\frac{|\tilde{A}|^2}{\rho_o c^2}\left[\cos\omega t - \cos\left(\omega t + \Delta\varphi_{BA}^o\right)\right]^2 = 0$$

$$w_{tot}^{inst}(x=0,t) \equiv w_{potl}^{inst}(x=0,t) + w_{kin}^{inst}(x=0,t) = \frac{2|\tilde{A}|^2}{\rho_o c^2}\cos^2\omega t = \frac{2|\tilde{A}|^2}{z_o c}\cos^2\omega t$$

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