function is itself a real function which requires that the imaginary part of the complex Cepstrum be an odd periodic function of the ω. See *phase unwrapping* in [9].

[9] shows that the power Cepstrum at time, nT is related to the complex Cepstrum at times nT and $-nT$ as follows,

$$\tilde{h}_{pc}(nT) = \left(\hat{h}(nT) + \hat{h}(-nT)\right)^2 \tag{24.608}$$

In speaker recognition we are usually not concerned with the reconstruction of the signal, so we use the power Cepstrum instead of the complex Cepstrum. In most cases, the power Cepstrum is defined without squaring the inverse transform. Using this definition, the power Cepstrum would become,

$$\begin{aligned}\hat{h}_{pc} &\stackrel{\Delta}{=} \mathscr{Z}^{-1}\{\log\left(|H(z)|^2\right)\} \\ &= \frac{1}{2\pi i}\oint_{\Gamma_c} \log\left(|H(z)|^2\right) z^{n-1} dz\end{aligned} \tag{24.609}$$

or in the Fourier domain,

$$\hat{h}_{pc} = \frac{1}{2\pi}\int_{-\pi}^{\pi} \log\left(|H(\omega)|^2\right) e^{i\omega t} d\omega \tag{24.610}$$

Another possible definition of Cepstrum is that of the *phase Cepstrum* which is analogous to the power Cepstrum with the difference that in the phase Cepstrum, the inverse z-transform of the phase of the complex logarithm is computed instead of the inverse z-transform of its magnitude. Ripples are generated in the phase of the complex logarithm much in the same way as the appear in its magnitude. See [9] for more on this subject.