Relationship Amongst Various Measures of Damping

(valid for small values of damping: \( \tan \phi < 0.1 \))

\[
Q^{-1} = \frac{\Psi}{2\pi} = \eta = \frac{\delta}{\pi} = \tan \phi = \phi = \frac{E''}{E'} = 2\zeta = \frac{\Delta W}{2\pi W} = \frac{\lambda \alpha}{\pi}
\]

- \( Q \) = Quality Factor
- \( \Psi \) = Specific Damping Capacity
- \( \eta \) = Loss Factor
- \( \delta \) = Logarithmic Decrement
- \( \phi \) = Phase Angle by which Stress Leads Strain
- \( E'' \) = Loss Modulus
- \( E' \) = Storage Modulus
- \( \zeta \) = Damping Ratio or Damping Factor
- \( \Delta W \) = Energy Loss Per Cycle
- \( W \) = Maximum Elastic Stored Energy
- \( \lambda \) = Wavelength of Elastic Wave
- \( \alpha \) = Attenuation