| **Damping ratio($\zeta$)** | **Undamped natural frequency($\omega_n$)** |
|---|---|
| Damping ratio basically indicates the amount of damping present in the overall system denoted by zeta, where damping is a counter force.It is a dimensionless measure describing how oscillations in a system decay after a disturbance. | The frequency of oscillation of the system without damping.A system may or may not have an associated natural frequency. |
| The damping ratio is a system parameter, denoted by $\zeta$, that can vary from undamped ($\zeta = 0$), underdamped ($\zeta <1$) through critically damped ($\zeta = 1$) to overdamped ($\zeta >1$). | Only systems with $\zeta <1$ have a natural frequency $\omega$ and only in the case that $\zeta = 0$ will the natural frequency $\omega = \omega_n$, the undamped natural frequency. |