



SHM: Damping Effects

Syll. Statements 4.3.1-4.3.6



Damped Oscillations

- Any oscillations that are taking place with the presence of one or more resistance forces, such as friction and air resistance.
- As a result of resistance forces, oscillations will eventually stop as the energy of its motion is transformed into other forms of energy—primarily thermal energy of both the environment and the system.



Types of damping effects:

- Under-damping:
 - Small resistance forces
 - Oscillations continue, but with a slightly smaller frequency than if force was not there
 - Amplitude gradually reduces until it approaches 0 and the oscillations stop
- The larger the damping force, the longer the period and the faster it will stop oscillating

Types of damping effects:

- Critical Damping:
 - The system returns to its equilibrium state as fast as possible without any oscillations

- Over-damping:
 - The system returns to equilibrium without oscillations, but **much slower than in critical damping**

Graphical comparison of damping effects
