

Underdamped single degree of freedom forced and free vibration response.

Engineering Science (CAL) Program Exchange, Queen Mary College - MEC3403



Description: -

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While the oscillation decays over time for a damped system under free vibration, the vibratory motion is maintained at a constant magnitude and frequency when an external energy source is present. Assume that the mass does not sway or 'twist'. We will consider each of these situations in turn.

Free and Forced Vibration of Single Degree of Freedom Systems, Effect of Damping

The mass is in free vibration when only two kinds of forces are acting on it: a an elastic- restoring force within the system and b gravitational or other constant forces that cause no displacement from the equilibrium position of the system.

Single Degree of Freedom Free Vibration

The kinetic energy and potential energy for the pendulum and spring mass system are shown in Fig.

Free vibration of single

Simple harmonic theory A special kind of motion occurs when the force on the body is proportional to the displacement of the body from equilibrium as shown in Fig. Rigid bodies We now move our attention to a rigid body whose position can be described by a single degree of freedom. The response of this system, rotating with a constant angular velocity ω , has not been presented previously in the literature; nevertheless, as in the last subsection 5.

Single Degree of Freedom Forced Vibration

If the disturbance is caused by an out of balance rotating shaft, then will change as the motor speeds up. At any position x , we can draw a free body diagram of the mass and consider the forces that act on it. Motion characteristics are studied for under-damped, critically damped and over-damped systems.

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