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SOLUTIONS MANUAL

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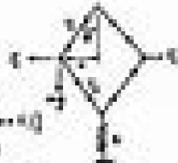
FIFTH EDITION

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(12) When $\omega = 0$, total vertical height is l
 When $\omega = \omega_c$, total vertical height is $l + \delta$
 Spring force = $k(\delta) = (k/m)l\omega_c^2$
 $= (k/l)(l)\omega_c^2$
 For vertical equilibrium of mass m ,
 $mg = \frac{1}{2}k\delta = \frac{1}{2}k\omega_c^2 l$... (1)



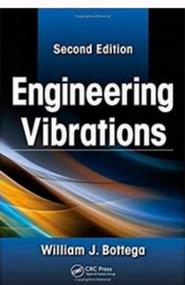
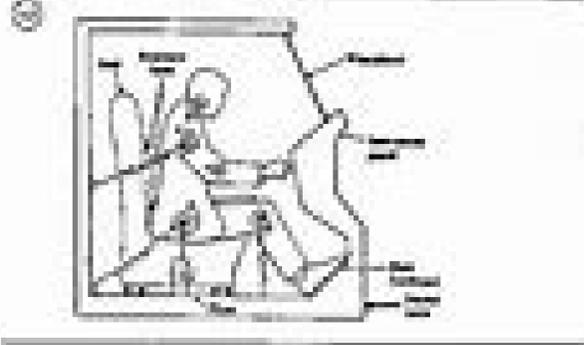
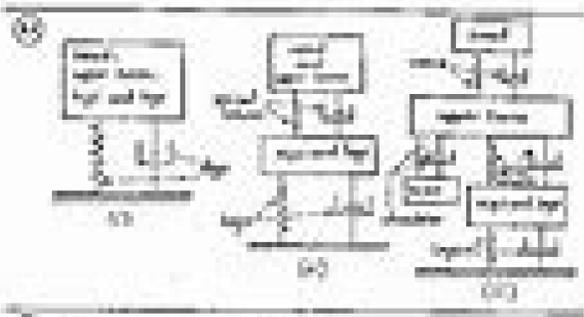

For horizontal equilibrium, $k_x = (k/2)\omega_c^2 l$
 $\delta = (k/2)\omega_c^2 l / k$... (2)

From (1), (2) we can express ω_c as
 $mg = \left(\frac{k}{2} \frac{\delta}{l} \right) \omega_c^2 l = \frac{1}{2}k\delta$
 i.e. $\delta = \frac{mg}{k} = \frac{1}{2} \omega_c^2 l$
 $\delta = \frac{k/2 \omega_c^2 l}{k} = \frac{1}{2} \omega_c^2 l$
 $\frac{mg}{k} = \frac{1}{2} \omega_c^2 l$
 $\omega_c = \sqrt{\frac{2mg}{kl}}$

Spring force = $k\delta = (k/m)l\omega_c^2 = \frac{1}{2}k\omega_c^2 l$
 $\omega_c = \sqrt{\frac{2mg}{kl}}$... (3)

This equation defines the equilibrium position of mass m .
 For small oscillations about the equilibrium position,
 Newton's second law gives
 $m\ddot{y} + ky = 0$... $\omega_n = \sqrt{k/m}$

Chapter 1 Fundamentals of Vibration



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Thus, Open Access initiative helps in unlocking the traditional methods of subscription articles and releasing information to tertiary level readers, who normally would not have access to first hand research studies. » Realizing the potential of Open Access in terms of greater visibility within and beyond the scientific community, in recent years, there has been a tremendous boost to Open Access movement through various Open Access publishers. We are one such publishing group that believes in this movement and is most ardently working towards the welfare and progress of scientific community. We are built upon the principles of Open Access and is determined to provide free and unrestricted access of research articles to scientists around the world for the advancement of science and technology. Bracing of posts/piers must not be connected to joists or bearers. Bracing, designed by others, will be required subject to post design, spacing and relevant loads. All connections used to connect the Stramit® Residential Floor Framing System to the rest of the structure should be capable of withstanding the required gravity, lateral, wind and all other applicable loads and actions. Posts or piers, supplied by others, must comply with the BCA and relevant standards, and are connected to the floor system using conventional bolted connections. Stramit's C-Joist System is suitable for suspended floor framing in single occupancy buildings which come within the scope of a Class 1a dwelling as defined by NCC. The building should conform to all limitations asset out in Clause 1.2 of AS 4055. Floor live load exceeding 1.5kPa (2.0kPa for balconies) requires engineering calculations. Floor concentrated load of more than 1.8kN requires engineering calculations. It may not be suitable for heavy items such as water beds, water tanks, large plants or aquariums, heavy gym equipment or pianos. Please seek engineering advice for such applications. The system is also not suitable for applications closer than 1km to aggressive environments. Connections between extended bearers and the structural elements of the building are the responsibility of the building designer. Stramit C-Joists must be used between bearers, as an in-plane system shown below. The use of the products in a joist on bearer configuration can lead to an undesirable transfer of movement-related vibration within and between rooms and is not recommended. The Stramit® Residential Floor Framing System uses the Limit State Method. Minimum design load and load combinations are generally as per NASH Standard Part 1. All screw fasteners must comply to Australian Standard AS3566, Class 2 - sheet flooring screws (internal use only), or Class 3 - connection screws. Generally any suitable 10 or 12-sized fasteners will connect the flooring components. Fasteners must not be positioned within 15mm of any metal edge. All particle board - or other floor sheeting - fasteners should follow the recommendations of the board manufacturer. Stramit recommends gluing and screwing all sheet floors. Particle board or plywood structural sheet flooring in accordance with NCC is used as the floor surface, although other floor materials with similar properties (eg. Min. modulus of elasticity E=3GPa) can be used. Please consult the floorboard manufacturer for details on sheet flooring, fasteners and adhesives that comply with NCC requirements for metal floor joist support systems. Data for the design of members, connections and support for roof load areas, non-roof load areas, and balcony and verandah areas in single and two-storey houses can be found in the Stramit Residential Floor Framing System Product Technical Manual. Stramit C-Joist and Bearers are cold rolled formed sections manufactured from high strength steel in material thickness ranging from 1.0mm (G550 grade, 550MPa minimum yield stress material) to 2.4mm (G450 grade, 450MPa minimum yield stress material), with Z350 zinc coating (350grams per square metre minimum coating mass) in accordance with Australian Standard AS1397. Other Stramit accessories, such as FCB3 brackets, extended bearer brackets and lateral end restraints, are made from 300MPa or 450MPa steel with a minimum galvanised coating of 275 grams per square metre. The Stramit® Residential Floor Framing System has been designed to NASH Residential and Low-Rise Steel Framing manual - Part 1 (Design Criteria) to meet the performance requirement of the National Construction Code. Using these provisions reduces the uncomfortable bounce and vibration that may be present in other systems. The product range can be used for both single and two-storey construction. Internal bearers or joists do not support any load bearing walls. Deflections under service loads are limited to a minimum of span/500 and 12mm. The Stramit® Residential Floor Framing System offers a choice of solutions to best fit your design needs: c-joist (AT 450mm centres) offers spans between 3.2m to 6.2m extended bearer spans available up to 8m, and extended bearer options.

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