

2.1 Solution

(a) Determine the equation of motion of the mass m in Fig. 1.

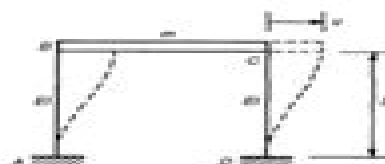


Figure 1

To determine the stiffness of the columns, we can use the unit dummy load method.



Figure 2

$$\begin{aligned} u &= \int_0^L \frac{(-Fx)(-x)}{EI} dx + \int_0^L \frac{M(-x)}{EI} dx \\ &= \frac{FL^3}{3EI} - \frac{ML^2}{2EI} \\ \theta &= \int_0^L \frac{(-Fx)(1)}{EI} dx + \int_0^L \frac{M(1)}{EI} dx \\ &= -\frac{FL^2}{2EI} + \frac{ML}{EI} \end{aligned}$$

Since $\theta = 0$,

$$M = \frac{FL}{2} \quad \text{and} \quad F = \frac{12EI}{L^2} u = ku$$

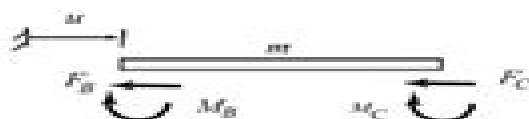


Figure 3

$$\sum F_x = m\ddot{u}$$

From the free-body diagram in Fig. 3,

$$-F_B - F_C = -\frac{12EI}{L^2} u - \frac{12EI}{L^2} u = m\ddot{u}$$

$$m\ddot{u} + \frac{24EI}{L^2} u = 0$$

Ans. (a)

(b) How would the equation of motion differ if the left-hand column had a stiffness $2EI$, with no other changes to the structure?

$$-F_B - F_C = -\frac{12(2EI)}{L^2} u - \frac{12EI}{L^2} u = m\ddot{u}$$

$$m\ddot{u} + \frac{36EI}{L^2} u = 0$$

Ans. (b)

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LP Steffe



Solution Manual Problem Of Structural Dynamics:

An efficient solution procedure for elastohydrodynamic contact problems considering structural dynamics Schmidt, Jan Henrik, 2019-01-14 This work presents an efficient solution procedure for the elastohydrodynamic EHD contact problem considering structural dynamics The contact bodies are modeled using reduced finite element models Singly diagonal implicit Runge Kutta SDIRK methods are used for adaptive time integration The structural model is coupled with the nonlinear Reynolds Equation using a monolithic coupling approach Finally a reduced order model of the complete nonlinear coupled problem is constructed **The Shock and Vibration Digest** ,1989-07 *Integrated Computer-Aided Design of Mechanical Systems* Shaker A. Meguid, 2012-12-06 In this book the author has presented an introduction to the practical application of some of the essential technical topics related to computer aided engineering CAE These topics include interactive computer graphics ICG computer aided design CAD computer and computer integrated manufacturing CIM aided analysis CAA Unlike the few texts available the present work attempts to bring all these seemingly specialised topics together and to demonstrate their integration in the design process through practical applications to real engineering problems and case studies This book is the result of the author s research and teaching activities for several years of postgraduate and undergraduate courses in mechanical design of rotating machinery computer aided engineering of finite elements solid mechanics engineering practical applications and properties of materials at Cranfield Institute of dynamics Technology Oxford Engineering Science and the University of Manchester Institute of Science and Technology UMIST It was soon realised that no books on the most powerful and versatile tools available to engineering designers existed To satisfy this developing need this book on the use of computers to aid the design process and to integrate design analysis and manufacture was prepared Scientific and Technical Aerospace Reports ,1995 Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AGRAWAL, PANKAJ ,SHRIKHANDE, MANISH ,2006-01-01 This comprehensive and well organized book presents the concepts and principles of earthquake resistant design of structures in an easy to read style The use of these principles helps in the implementation of seismic design practice The book adopts a step by step approach starting from the fundamentals of structural dynamics to application of seismic codes in analysis and design of structures The text also focusses on seismic evaluation and retrofitting of reinforced concrete and masonry buildings The text has been enriched with a large number of diagrams and solved problems to reinforce the understanding of the concepts Intended mainly as a text for undergraduate and postgraduate students of civil engineering this text would also be of considerable benefit to practising engineers architects field engineers and teachers in the field of earthquake resistant design of structures **Computer Program Abstracts** ,1981 *Applied Mechanics Reviews* ,1981 *Developments in Mechanics of Structures & Materials* Andrew J.

Deeks, Hong Hao, 2004-11-15 This volume contains the peer reviewed papers accepted for presentation at the 18th Australasian Conference on the Mechanics of Structures and Materials held in Perth 2004 Papers contained describe significant advances in a large number of diverse areas indicating the range of applications of the basic principles and techniques of mechanics from traditional areas such as steel and concrete structures through to modern areas such as structural health monitoring and structural rehabilitation using carbon fibre composites With topics ranging from foundation piles to shaken baby syndrome this volume reports the results of countless thousands of hours of research and millions of dollars of research funding

Shock and Vibration Computer Programs Barbara Pilkey, 1975 *Journal of Engineering Mechanics*, 1999

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