

Solutions to Problems in Goldstein, *Classical Mechanics*, Second Edition

Homer Reid

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Chapter 1

Problem 1.1

A nucleus, originally at rest, decays radioactively by emitting an electron of momentum $1.73 \text{ MeV}/c$, and at right angles to the direction of the electron a neutrino with momentum $1.00 \text{ MeV}/c$. (The MeV (million electron volt) is a unit of energy, used in modern physics, equal to $1.60 \times 10^{-6} \text{ erg}$. Correspondingly, MeV/c is a unit of linear momentum equal to $5.34 \times 10^{-17} \text{ gm-cm/sec.}$) In what direction does the nucleus recoil? What is its momentum in MeV/c ? If the mass of the residual nucleus is $3.90 \times 10^{-27} \text{ gm}$, what is its kinetic energy, in electron volts?

Place the nucleus at the origin, and suppose the electron is emitted in the positive y direction, and the neutrino in the positive x direction. Then the resultant of the electron and neutrino momenta has magnitude

$$|\mathbf{p}_{\text{e}+\nu}| = \sqrt{(1.73)^2 + 1^2} = 2 \text{ MeV}/c,$$

and its direction makes an angle

$$\theta = \tan^{-1} \frac{1.73}{1} = 60^\circ$$

with the x axis. The nucleus must acquire a momentum of equal magnitude and directed in the opposite direction. The kinetic energy of the nucleus is

$$T = \frac{p^2}{2m} = \frac{4 \text{ MeV}^2 c^{-2}}{2 \cdot 3.9 \cdot 10^{-27} \text{ gm}} \cdot \frac{1.78 \cdot 10^{-27} \text{ gm}}{1 \text{ MeV } c^{-2}} = 9.1 \text{ eV}$$

This is much smaller than the nucleus rest energy of several hundred GeV , so the non-relativistic approximation is justified.

Goldstein Classical Mechanics Solution Manual

**C. Taylor, L. Flamand, G. Dalmaz, D.
Dowson, P.R.N. Childs, Y. Berthier, J.M.
Georges, A A Lubrecht**



Goldstein Classical Mechanics Solution Manual:

On the Finite Element Solution of General Contact Problems Panayiotis Papadopoulos, 1991 **Subject Guide to Books in Print**, 1993 *American Journal of Physics*, 1993 **Forthcoming Books** Rose Arny, 1999 **Automatic Control in Space**, 2 John A. Aseltine, 1969 Elements of Quantum Optics Brice Scott, 2019-09-03 The book gives a broad coverage of the basic elements necessary to understand and carry out research in quantum optics It presents a variety of theoretical tools and important results for two level and semiconductor media many of which could only be found in the original literature of in specialized monographs up to now The text reveals the close connection between many seemingly unrelated topics The book e Quantum Opticse has been written to meet the requirement of the degree and post graduate students The subject matter has been discussed in such a simple way that the students will find no difficult to understand it Most of the examples given in the book have been selected from various university examination papers and the book cover the syllabus of almost all the universities *Fundamental Aspects of Heterogeneous Catalysis Studied by Particle Beams* H.H. Brongersma, R.A. van Santen, 2013-03-08 Present day heterogeneous catalysis is rapidly being transformed from a technical art into a science based technology A major contribution to this important change is the advance of surface spectroscopic techniques able to characterize the complex surfaces of the heterogeneous catalytic system The Advanced Study Institute on which the current proceedings is based has as its primary aim the bringing together of a variety of lecturers outstanding in those fields of experience to enable a broad coverage of different relevant approaches Not only catalyst characterization but also catalytic reactivity had to be covered in order to relate catalyst properties with catalyst performance Since modern catalysis relates catalytic performance to microscopic molecular catalyst features theoretical electronic aspects also had to be included The Advanced Study Institute had a unique feature in that it brought together physicists catalytic chemists and chemical engineers whom rarely directly interact From physics especially new experimental possibilities of beams were emphasized At present it is possible to obtain very detailed information on model catalysts whilst the applications to practical catalysts are gaining rapidly in sophistication Apart from the plenary lectures the Institute included hot topics to highlight special developments and offered participants the opportunity to present contributed papers either orally or as a poster These contributions formed an integral part of the summer school and significantly enhanced the interaction between participants Inclusion of the hot topics and contributed papers in these proceedings give them an added topical value Physics in Canada, 1972 *NASA Contractor Report* United States. National Aeronautics and Space Administration, 1970 *Surface Waves in Geomechanics: Direct and Inverse Modelling for Soils and Rocks* Carlo G. Lai, Krzysztof Wilmanski, 2007-03-23 Theories of surface waves develop since the end of XIX century and many fundamental problems like existence phase and group velocities attenuation quality factor mode conversion etc have been in part successfully solved within the framework of such simple models as ideal fluids or linear elasticity However a sufficiently

complete presentation of this subject particularly for solids is still missing in the literature The sole exception is the book of I A Viktorov which contains an extensive discussion of fundamental properties of surface waves in homogeneous and stratified linear elastic solids with particular emphasis on contributions of Russian scientists Unfortunately the book has never been translated to English and its Russian version is also hardly available Practical applications of surface waves develop intensively since a much shorter period of time than theories even though the motivation of discoverers of surface waves such as Lord Rayleigh stems from their appearance in geophysics and seismology Nowadays the growing interest in practical applications of surface waves stem from the following two main factors surface waves are ideal for developing relatively cheap and convenient methods of nondestructive testing of various systems spanning from nanomaterials e g [Catalog of Books and Reports in the Bureau of Mines Technical Library, Pittsburgh, Pa](#) United States. Bureau of Mines. Technical Library, Pittsburgh,1968

Perturbation Theory Based on Lie Transforms and Its Application to the Stability of Motion Near Sun-perturbed Earth-moon Triangular Libration Points Ahmed Aly Kamel,Stanford University. Department of Aeronautics and Astronautics,1969

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Elastohydrodynamics - '96 C. Taylor,L. Flamand,G. Dalmaz,D. Dowson,P.R.N. Childs,Y. Berthier,J.M. Georges,A A Lubrecht,1997-07-22 This volume represents the latest issue of a collection of Proceedings each dealing with a different topic in Tribology This volume contains the Proceedings from the 23rd Leeds Lyon Symposium which addressed the topic of Elastohydrodynamics and was attended by many international experts in the field The Keynote Address was presented by Professor Stathis Ioannides on the subject of Tribology in Rolling Element Bearings and was followed by fifteen other sessions covering a wide variety of general areas from Experimental to Lubricant Properties In addition nine other invited technical papers were presented to support the sessions

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Gear Geometry and Applied Theory Faydor L. Litvin,Alfonso Fuentes,2004-09-06 This revised expanded edition covers the theory design geometry and manufacture of all types of gears and gear drives This is an invaluable reference for designers theoreticians students and manufacturers This edition includes advances in gear theory gear manufacturing and computer simulation Among the new topics are 1 New geometry for modified spur and helical gears face gear drives and cycloidal pumps 2 New design approaches for one stage planetary gear trains and spiral bevel gear drives 3 An enhanced approach for stress analysis of gear drives with FEM 4 New methods of grinding face gear drives generating double crowned pinions and improved helical gear shaving 5 Broad application of simulation of meshing and TCA 6 New theories on the simulation of meshing for multi body systems detection of cases wherein the contact line on generating surfaces may have its own envelope and detection and avoidance of singularities of generated surfaces

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