

SEISMIC LOSS ESTIMATION FOR EFFICIENT DECISION MAKING

Brendon A. Bradley¹, Rajesh P. Dhakal², Misko Cubrinovski³,
Gregory A. MacRae³ & Dominic S. Lee⁴

SUMMARY

In order to incorporate seismic risk of facilities into a decision making framework, procedures are needed to quantify such risk for stakeholders. Seismic loss estimation methods combine seismic hazard, structural response, damage fragility, and damage consequences to allow quantification of seismic risk. This paper presents a loss estimation methodology which provides various measures of seismic risk for a specific facility. The methodology is component-based and can therefore distinguish between different structural configurations or different facility contents and is consistent with state-of-the-art loss assessment procedures. Loss is measured in the forms of direct structural and non-structural repair costs, and although not considered in the example, business disruption and occupant injuries can also be considered. This framework has been packaged in a computer code available for future dissemination in the public domain so that users need only to have a basic understanding of the methodology and the input data that is required. Discussion is given to the flexibility of the framework in terms of the rigour which can be employed at each of the main steps in the procedure. Via a case study of a high-rise office building, the use of the methodology in decision-making is illustrated. Methodological requirements and further research directions are discussed. →

INTRODUCTION

Current seismic design codes provide guidelines for the design and detailing of structures with the primary goal of preventing global collapse during strong ground motion shaking. Observations from worldwide earthquakes in the past two decades have illustrated that with few exceptions, structures designed to these state-of-practice guidelines are sufficient for providing life safety with a high degree of confidence. However, these events illustrated the severe economic consequences resulting from earthquakes in highly developed regions of society. These economic consequences can be primarily attributed to: (i) direct economic losses associated with repairing damage within a structure; (ii) direct losses associated with injuries and casualties; and (iii) indirect losses associated with the loss of income due to business disruption. These three forms of losses (damage, death and downtime) are known as the '3D's'. Some examples from the United States include the 1994 Northridge (\$17-26 billion), and 1989 Loma Prieta (\$11 billion) earthquakes [1]. In response to these observed losses it has become apparent that seismic design of structures should consider all of these potential consequences and their likelihood of occurrence.

Quantification of seismic risk is a difficult task which is subject to inherent variability. Although it can be roughly forecasted, it is not known when and where future significant fault ruptures will occur. Even when an earthquake occurs at a particular location, due to the complex rupture mechanism, process of seismic wave propagation and site effects, the intensity, frequency content and duration of ground motions at

a particular site are also uncertain. These uncertainties in the ground motions affecting a given site cause corresponding uncertainty in the level of structural response, and associated damage in the structure. Finally, the cost to repair a damaged structure is also uncertain and depends on available resources and demand. In order to rigorously assess the seismic risk of a structure all of the above uncertainties should be accounted for. Thus it becomes necessary that the problem of seismic risk is cast into a probabilistic framework which can propagate such uncertainties in each of the input variables and give a probabilistic output useful for decision making processes.

These aforementioned uncertainties result from either inherent randomness in a process, or uncertainty due to the limited knowledge and application of engineering models. These two different types of uncertainty are referred to as aleatory randomness and epistemic uncertainty, respectively. An example of aleatory randomness would be the variation in the level of ground motion observed at a site due to different ground motions resulting from the same rupture magnitude and source-to-site distance, while epistemic uncertainty would result from which ground motion prediction equation is used to estimate the level of ground motion at the site. As aleatory randomness is deemed as an inherent property of complex phenomena, it cannot be reduced; epistemic uncertainty being knowledge-based can be reduced if better knowledge of the phenomena is acquired. As these two different uncertainties are related to different aspects of the considered problem they deserve separate treatment within a decision making process.

This paper presents a discussion of the use of seismic loss estimation for decision making at various stages of design

¹ Ph.D Candidate, Department of Civil Engineering, University of Canterbury (member)

² Senior Lecturer, Department of Civil Engineering, University of Canterbury (member)

³ Associate Professor, Department of Civil Engineering, University of Canterbury (member)

⁴ Senior Lecturer, Department of Mathematics and Statistics, University of Canterbury

Seismic Loss Estimation For Efficient Decision Making

RM Cervero



Seismic Loss Estimation For Efficient Decision Making:

This book delves into Seismic Loss Estimation For Efficient Decision Making. Seismic Loss Estimation For Efficient Decision Making is a crucial topic that must be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Seismic Loss Estimation For Efficient Decision Making, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Seismic Loss Estimation For Efficient Decision Making
 - Chapter 2: Essential Elements of Seismic Loss Estimation For Efficient Decision Making
 - Chapter 3: Seismic Loss Estimation For Efficient Decision Making in Everyday Life
 - Chapter 4: Seismic Loss Estimation For Efficient Decision Making in Specific Contexts
 - Chapter 5: Conclusion
 2. In chapter 1, this book will provide an overview of Seismic Loss Estimation For Efficient Decision Making. The first chapter will explore what Seismic Loss Estimation For Efficient Decision Making is, why Seismic Loss Estimation For Efficient Decision Making is vital, and how to effectively learn about Seismic Loss Estimation For Efficient Decision Making.
 3. In chapter 2, this book will delve into the foundational concepts of Seismic Loss Estimation For Efficient Decision Making. This chapter will elucidate the essential principles that must be understood to grasp Seismic Loss Estimation For Efficient Decision Making in its entirety.
 4. In chapter 3, this book will examine the practical applications of Seismic Loss Estimation For Efficient Decision Making in daily life. The third chapter will showcase real-world examples of how Seismic Loss Estimation For Efficient Decision Making can be effectively utilized in everyday scenarios.
 5. In chapter 4, the author will scrutinize the relevance of Seismic Loss Estimation For Efficient Decision Making in specific contexts. This chapter will explore how Seismic Loss Estimation For Efficient Decision Making is applied in specialized fields, such as education, business, and technology.
 6. In chapter 5, the author will draw a conclusion about Seismic Loss Estimation For Efficient Decision Making. This chapter will summarize the key points that have been discussed throughout the book.
- This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Seismic Loss Estimation For Efficient Decision Making.

Table of Contents Seismic Loss Estimation For Efficient Decision Making

1. Understanding the eBook Seismic Loss Estimation For Efficient Decision Making
 - The Rise of Digital Reading Seismic Loss Estimation For Efficient Decision Making
 - Advantages of eBooks Over Traditional Books
2. Identifying Seismic Loss Estimation For Efficient Decision Making
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Seismic Loss Estimation For Efficient Decision Making
 - User-Friendly Interface
4. Exploring eBook Recommendations from Seismic Loss Estimation For Efficient Decision Making
 - Personalized Recommendations
 - Seismic Loss Estimation For Efficient Decision Making User Reviews and Ratings
 - Seismic Loss Estimation For Efficient Decision Making and Bestseller Lists
5. Accessing Seismic Loss Estimation For Efficient Decision Making Free and Paid eBooks
 - Seismic Loss Estimation For Efficient Decision Making Public Domain eBooks
 - Seismic Loss Estimation For Efficient Decision Making eBook Subscription Services
 - Seismic Loss Estimation For Efficient Decision Making Budget-Friendly Options
6. Navigating Seismic Loss Estimation For Efficient Decision Making eBook Formats
 - ePub, PDF, MOBI, and More
 - Seismic Loss Estimation For Efficient Decision Making Compatibility with Devices
 - Seismic Loss Estimation For Efficient Decision Making Enhanced eBook Features
7. Enhancing Your Reading Experience

- Adjustable Fonts and Text Sizes of Seismic Loss Estimation For Efficient Decision Making
- Highlighting and Note-Taking Seismic Loss Estimation For Efficient Decision Making
- Interactive Elements Seismic Loss Estimation For Efficient Decision Making
- 8. Staying Engaged with Seismic Loss Estimation For Efficient Decision Making
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Seismic Loss Estimation For Efficient Decision Making
- 9. Balancing eBooks and Physical Books Seismic Loss Estimation For Efficient Decision Making
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Seismic Loss Estimation For Efficient Decision Making
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Seismic Loss Estimation For Efficient Decision Making
 - Setting Reading Goals Seismic Loss Estimation For Efficient Decision Making
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Seismic Loss Estimation For Efficient Decision Making
 - Fact-Checking eBook Content of Seismic Loss Estimation For Efficient Decision Making
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

Seismic Loss Estimation For Efficient Decision Making Introduction

In the digital age, access to information has become easier than ever before. The ability to download Seismic Loss Estimation For Efficient Decision Making has revolutionized the way we consume written content. Whether you are a student looking for

course material, an avid reader searching for your next favorite book, or a professional seeking research papers, the option to download Seismic Loss Estimation For Efficient Decision Making has opened up a world of possibilities. Downloading Seismic Loss Estimation For Efficient Decision Making provides numerous advantages over physical copies of books and documents. Firstly, it is incredibly convenient. Gone are the days of carrying around heavy textbooks or bulky folders filled with papers. With the click of a button, you can gain immediate access to valuable resources on any device. This convenience allows for efficient studying, researching, and reading on the go. Moreover, the cost-effective nature of downloading Seismic Loss Estimation For Efficient Decision Making has democratized knowledge. Traditional books and academic journals can be expensive, making it difficult for individuals with limited financial resources to access information. By offering free PDF downloads, publishers and authors are enabling a wider audience to benefit from their work. This inclusivity promotes equal opportunities for learning and personal growth. There are numerous websites and platforms where individuals can download Seismic Loss Estimation For Efficient Decision Making. These websites range from academic databases offering research papers and journals to online libraries with an expansive collection of books from various genres. Many authors and publishers also upload their work to specific websites, granting readers access to their content without any charge. These platforms not only provide access to existing literature but also serve as an excellent platform for undiscovered authors to share their work with the world. However, it is essential to be cautious while downloading Seismic Loss Estimation For Efficient Decision Making. Some websites may offer pirated or illegally obtained copies of copyrighted material. Engaging in such activities not only violates copyright laws but also undermines the efforts of authors, publishers, and researchers. To ensure ethical downloading, it is advisable to utilize reputable websites that prioritize the legal distribution of content. When downloading Seismic Loss Estimation For Efficient Decision Making, users should also consider the potential security risks associated with online platforms. Malicious actors may exploit vulnerabilities in unprotected websites to distribute malware or steal personal information. To protect themselves, individuals should ensure their devices have reliable antivirus software installed and validate the legitimacy of the websites they are downloading from. In conclusion, the ability to download Seismic Loss Estimation For Efficient Decision Making has transformed the way we access information. With the convenience, cost-effectiveness, and accessibility it offers, free PDF downloads have become a popular choice for students, researchers, and book lovers worldwide. However, it is crucial to engage in ethical downloading practices and prioritize personal security when utilizing online platforms. By doing so, individuals can make the most of the vast array of free PDF resources available and embark on a journey of continuous learning and intellectual growth.

FAQs About Seismic Loss Estimation For Efficient Decision Making Books

What is a Seismic Loss Estimation For Efficient Decision Making PDF? A PDF (Portable Document Format) is a file format developed by Adobe that preserves the layout and formatting of a document, regardless of the software, hardware, or operating system used to view or print it. **How do I create a Seismic Loss Estimation For Efficient Decision Making PDF?** There are several ways to create a PDF: Use software like Adobe Acrobat, Microsoft Word, or Google Docs, which often have built-in PDF creation tools. Print to PDF: Many applications and operating systems have a "Print to PDF" option that allows you to save a document as a PDF file instead of printing it on paper. Online converters: There are various online tools that can convert different file types to PDF. **How do I edit a Seismic Loss Estimation For Efficient Decision Making PDF?** Editing a PDF can be done with software like Adobe Acrobat, which allows direct editing of text, images, and other elements within the PDF. Some free tools, like PDFescape or Smallpdf, also offer basic editing capabilities. **How do I convert a Seismic Loss Estimation For Efficient Decision Making PDF to another file format?** There are multiple ways to convert a PDF to another format: Use online converters like Smallpdf, Zamzar, or Adobe Acrobats export feature to convert PDFs to formats like Word, Excel, JPEG, etc. Software like Adobe Acrobat, Microsoft Word, or other PDF editors may have options to export or save PDFs in different formats. **How do I password-protect a Seismic Loss Estimation For Efficient Decision Making PDF?** Most PDF editing software allows you to add password protection. In Adobe Acrobat, for instance, you can go to "File" -> "Properties" -> "Security" to set a password to restrict access or editing capabilities. Are there any free alternatives to Adobe Acrobat for working with PDFs? Yes, there are many free alternatives for working with PDFs, such as: LibreOffice: Offers PDF editing features. PDFsam: Allows splitting, merging, and editing PDFs. Foxit Reader: Provides basic PDF viewing and editing capabilities. How do I compress a PDF file? You can use online tools like Smallpdf, ILovePDF, or desktop software like Adobe Acrobat to compress PDF files without significant quality loss. Compression reduces the file size, making it easier to share and download. Can I fill out forms in a PDF file? Yes, most PDF viewers/editors like Adobe Acrobat, Preview (on Mac), or various online tools allow you to fill out forms in PDF files by selecting text fields and entering information. Are there any restrictions when working with PDFs? Some PDFs might have restrictions set by their creator, such as password protection, editing restrictions, or print restrictions. Breaking these restrictions might require specific software or tools, which may or may not be legal depending on the circumstances and local laws.

Find Seismic Loss Estimation For Efficient Decision Making :

[boss indicator binary options signals indicator for](#)

[broken-monsters-lauren-beukes-pdf](#)

[bpm cbok guide arkcom](#)

bruce hayes introductory phonology answer key

botkin keller environmental science 6th edition

business and society stakeholders ethics public policy 13th edition

[business result upper intermediate answer key](#)

brief introduction to circuit analysis solutions manual

[busbar ampacity table bus bar copper connector](#)

brandix india apparel city biac

bring on the empty horses david niven

bowman lancing marine

business communication process product

[brushless esc schematic pdf download](#)

[business studies fourth edition dave hall](#)

Seismic Loss Estimation For Efficient Decision Making :

Managing and Using Information System Pearlson and Saunders', Managing and Using Information Systems: A Strategic Approach, Fifth Edition, conveys the insights and knowledge MBA students need to ... Managing and Using Information Systems Pearlson and Saunders' Third Edition of "Managing and Using Information A Strategic Approach" gives students the insights and knowledge they need to become ... E-book Download Managing and Using ... - YUMPU Aug 22, 2020 — ... Managing and Using Information Systems: A Strategic Approach, Fifth Edition, conveys the insights and knowledge MBA students need to become ... Managing and Using Information Systems Pearlson and Saunders', Managing and Using Information Systems: A Strategic Approach, Fifth Edition, conveys the insights and knowledge MBA students need to ... Managing and Using Information Systems: A Strategic ... Jul 25, 2012 — Pearlson and Saunders', Managing and Using Information Systems: A Strategic Approach, Fifth Edition, conveys the insights and knowledge MBA ... Managing and Using Information Systems 5th edition ... Full Title: Managing and Using Information Systems: A Strategic Approach ; Edition: 5th edition ; ISBN-13: 978-1118281734 ; Format: Paperback/softback ; Publisher: ... Managing and Using Information Systems by KE Pearlson · 2016 · Cited by 103 — Title: Managing and using information systems: a strategic approach / Keri. E. Pearlson, Carol S. Saunders, Dennis F. Galletta. Description: 6th edition. | ... Keri E Pearlson | Get Textbooks Strategic Management of Information Systems(5th Edition) by Keri E. Pearlson ... Managing and Using Information Systems(5th Edition) A Strategic Approach 5e ... Managing and Using Information Systems Managing and Using Information Systems: A Strategic Approach ;

Publication Date: December 5th, 2019 ; Publisher: Wiley ; ISBN: 9781119560562 ; Pages: 368. Keri Pearlson & Carol Saunders: Managing and ... Keri Pearlson & Carol Saunders: Managing and Using Information Systems: A Strategic Approach - Fifth Edition ; Original Title. Managing and Using Information ... Pipe fitter NCCER Flashcards Study Flashcards On Pipe fitter NCCER at Cram.com. Quickly memorize the terms, phrases and much more. Cram.com makes it easy to get the grade you want! Pipefitter Nccer V4 study guide Flashcards Study with Quizlet and memorize flashcards containing terms like OSHA approved anchorage point, 3 1/2, 30 PSI and more. Free Pipefitter Practice Test with Questions and Answers 2023 This is a free Pipefitter practice test with full answers and explanations, to give you a taste of the real exam. Pipefitter Test - Fill Online, Printable, Fillable, Blank | pdfFiller General pipefitter interview questions Tell us something about yourself. How did you know about this job opportunity? Do you know anyone already working for ... Pipefitting Pipefitting covers key concepts of installation and repair of high- and low-pressure pipe systems used in manufacturing, in the generation of electricity and ... pipe fitter test Flashcards Study with Quizlet and memorize flashcards containing terms like What does TE in TE-601 stand for?, what does B.T.U stand for?, what is the boiling point of ... nccer pipefitter test answers Discover videos related to nccer pipefitter test answers on TikTok. Nccer Pipefitting Level 2 Drawings And Detail Sheets Study Flashcards On Nccer pipefitting level 2 drawings and detail sheets at Cram.com. Quickly memorize the terms, phrases and much more. Horizons Chapter 5 - WordPress â€” www.wordpress.com Jul 13, 2015 — ... moved farther north and west into the hinterland. In order to live, they ... West to the rest of Canada. You will read more about this issue in ... Changes Come to the Prairies - Charles Best Library In this chapter, you will study the development of the Prairies and the impact of these changes on the Aboriginal peoples of the Northwest. Horizons Canada Moves West chapter 2 Flashcards | Quizlet Study with Quizlet and memorize flashcards containing terms like Nationalism, Anglican, Assimilation and more. American Horizons Chapter 5 Flashcards | Quizlet Study with Quizlet and memorize flashcards containing terms like By the 1750s, colonial newspapers, Between 1730 and 1775 there were so many immigrants from ... Social Studies - Horizons Canada Moves West | PDF - Scribd Apr 16, 2013 — Chapter 5 Microeconomics by David Besanko Ronald Braeutigam Test Bank. Grade 9 Socials 2016 - mr. Burgess' rbss social studies Horizons Text book: Chapter 1 - The Geography of Canada. (Nov. 24 - Dec. 9) ... 2 - Chapter 5 chapter review. test_study_guide.pdf. File Size: 84 kb. File Type ... Horizons: Canada Moves West - Goodreads Jun 18, 2015 — Read reviews from the world's largest community for readers. undefined. Art in Focus.pdf ... Chapter 5 Review. 123. Page 151. 124. Page 152. 2. ART OF EARLY. CIVILIZATIONS prepare yourself, for you are about to embark on a magical journey through art. 1 Chapter 5: Changing Ocean, Marine Ecosystems ... - IPCC Coordinating Lead Authors: Nathaniel L. Bindoff (Australia), William W. L. Cheung (Canada), James G. 4. Kairo (Kenya). Social Studies 10 Course Outline - Oak Bay High School The goal of this unit is to study Canada's western expansion across the Prairies and its impact on ... This unit uses the textbook Horizons: Canada Moves West, ...