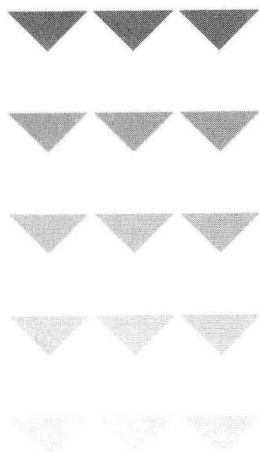


An aerial night photograph of a city skyline, likely New York City, with numerous skyscrapers illuminated. The image is overlaid with a dark blue horizontal band containing the title. The background is filled with vibrant, radial light trails in shades of red, orange, and yellow, emanating from the city center, creating a sense of dynamic energy and movement.

Structural Analysis

S E C O N D E D I T I O N

Aslam Kassimali



STRUCTURAL ANALYSIS

SECOND EDITION

ASLAM KASSIMALI

Southern Illinois University—Carbondale



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PREFACE

The objective of this book is to develop an understanding of the basic principles of structural analysis. Emphasizing the intuitive classical approach, *Structural Analysis* covers the analysis of statically determinate and indeterminate beams, trusses, and rigid frames. It also presents an introduction to the matrix analysis of structures.

The book is divided into three parts. Part One presents a general introduction to the subject of structural engineering. It includes a chapter devoted entirely to the topic of loads because attention to this important topic is generally lacking in many civil engineering curricula. Part Two, consisting of Chapters 3 through 10, covers the analysis of statically determinate beams, trusses, and rigid frames. The chapters on deflections (Chapters 6 and 7) are placed before those on influence lines (Chapters 8 and 9), so that influence lines for deflections can be included in the latter chapters. This part also contains a chapter on the analysis of symmetric structures (Chapter 10). Part Three of the book, Chapters 11 through 17, covers the analysis of statically indeterminate structures. The format of the book is flexible to enable instructors to emphasize topics that are consistent with the goals of the course.

Each chapter of the book begins with an introductory section defining its objective and ends with a summary section outlining its salient features. An important general feature of the book is the inclusion of step-by-step procedures for analysis to enable students to make an easier transition from theory to problem solving. Numerous solved examples are provided to illustrate the application of the fundamental concepts.

A CD-ROM containing computer software for the analysis of plane frames, continuous beams, and trusses is attached to the back cover. This interactive software can be used to simulate a variety of structural and loading configurations and to determine cause versus effect relationships between loading and various structural parameters, thereby enhancing the students' understanding of the behavior of structures. A solutions manual, containing complete solutions to text exercises, is also available for the instructor.

A Note on the Revised Edition

In this second edition, the number of problems has been increased by about 33 percent (including some new design- and computer-oriented problems) to bring the total to over 500. The chapter on loads has been revised to meet the provisions of the ASCE 7-95 standard, and Appendix C rewritten to describe the new Windows® 95-based computer software, which has been upgraded to

include the effects of support settlements, temperature changes, and fabrication errors in the analysis. The new software also shows deflected shapes of structures, to enhance students' understanding of structural response due to various types of loadings. There are numerous other minor revisions, including an expanded discussion of sidesway of frames in Chapter 15, and many figures have been redrawn and rearranged to enhance clarity.

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Aslam Kassimali



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PART ONE



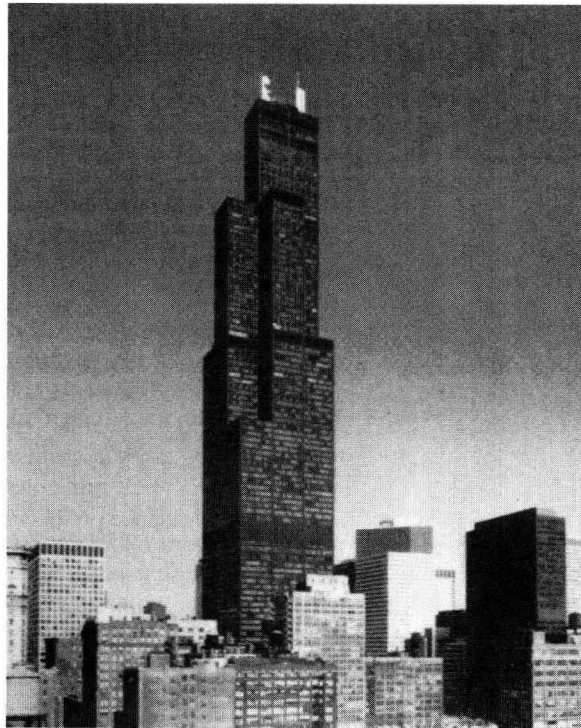
INTRODUCTION TO STRUCTURAL ANALYSIS AND LOADS



1

INTRODUCTION TO STRUCTURAL ANALYSIS

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- 1.2 Role of Structural Analysis in Structural Engineering Projects
- 1.3 Classification of Structures
- 1.4 Analytical Models
- Summary



The Sears Tower, Chicago

Photo courtesy of Bethlehem Steel Corporation