

## Preface

Twenty years ago, that is, four years after the 1968 Tokachi-oki earthquake of  $M_{JMA}=7.9$ , the Research Subcommittee on Earthquake Ground Motion was organized under the Steering Committee for Structural Dynamics in the Architectural Institute of Japan. Its purpose is to exchange and discuss the latest information on evaluation and prediction of earthquake ground motion. Since then, the committee has held an annual symposium to disseminate its research results to concerned scientists and engineers. In 1983, the committee published a book in Japanese titled "Earthquake Motion and Ground Condition", based on the knowledge accumulated during the preceding ten symposia and also from the activities of the committee during that time. After nine years has passed since that publication, the committee decided to publish this revised edition to commemorate the 20th anniversary.

Since that first publication, several disastrous earthquake events have occurred in the world, for example, the 1983 Nihonkai-chubu, Japan, earthquake ( $M_{JMA}=7.7$ ), the 1984 Naganoken-seibu, Japan, earthquake ( $M_{JMA}=6.8$ ), the 1985 Central Chile earthquake ( $M_S=7.8$ ), the 1985 Michoacan, Mexico, earthquake ( $M_S=8.1$ ), the 1988 Spitak, Armenia, earthquake ( $M_S=6.9$ ), the 1989 Loma Prieta, California, earthquake ( $M_S=7.1$ ), the 1990 Gilan, Iran, earthquake ( $M_S=7.7$ ), and the 1990 Luzon, Philippines, earthquake ( $M_S=7.8$ ). The valuable seismograms recorded during these earthquake events and the several types of phenomena observed have shown us new facts and have urged us to research new critical problems in seismology and earthquake engineering. Examples of these critical areas are:

- Accumulation of a seismogram data set due to a main shock and aftershocks, and also development of a semi-empirical approach for ground motion prediction based on the scaling law of an earthquake source ;
- Understanding of strong ground motion in an epicentral region using seismological array observation data ;
- Study of attenuation characteristics of ground motion and evaluation of Q-values of seismic wave propagation based on a large amount of seismogram data observed simultaneously in an extensive area ;
- Survey of underground structure, and also consideration of effects of surface geology on seismic motion, in particular ground motion characteristics on a deep sedimentary basin ;
- Strong ground motion in seismic design ;
- Seismic zonation and disaster prevention planning.

In view of these important topics, the committee judged that this second edition should be completely revised, and also acknowledged that the need to exchange the information and knowledge on a global scale required the full text of this new edition be written in English. The committee hopes that this publication will be useful to researchers, engineers, and students throughout the world.

Finally, the committee would like to thank all who have cooperated in forming this publication. This publication was supported financially by the International Exchange Promotion Foundation of the Architectural Institute of Japan and the Kajima Foundation for the Promotion of Science. Our appreciation is also expressed to Mrs. Nancy Whitby for her great cooperation in reading and correcting the English in the original drafts.

The Research Subcommittee on Earthquake Ground Motion  
The Architectural Institute of Japan

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**AIJ Committee Members**

**Editors and Authors**

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