

# FREE EBOOK EFFECTS OF EARTHQUAKE GROUND MOTION SELECTION AND SCALING (DOWNLOAD ONLY)

EARTHQUAKE GROUND MOTION IS A COMPILATION OF TEN CHAPTERS COVERING TECTONICS SEISMICITY SITE EFFECTS TSUNAMIS INFRASTRUCTURE AND INSTRUMENTATION IT PRESENTS STATE OF THE ART TECHNIQUES FOR RETRIEVING RUPTURE MODELS SEISMOGENIC STRUCTURES AND VALIDATION OF FOCAL MECHANISMS IT ALSO PRESENTS MACROSEISMIC ARCHIVING TOOLS FOR HISTORICAL AND INSTRUMENTAL EARTHQUAKES AND THE FUNDAMENTALS OF SEISMIC TOMOGRAPHY THE BOOK DESCRIBES THE SITE RESPONSE ANALYSIS IN 2D AND 3D CONSIDERING TOPOGRAPHIC AND SOIL STRUCTURE INTERACTIONS ITS INCORPORATION IN A SEISMIC HAZARD ANALYSIS AND THE IMPACT OF EARTHQUAKES ON THE COST OF RECONSTRUCTION THE FINAL SECTIONS ARE DEVOTED TO THE GENESIS OF EARTHQUAKES TSUNAMIS NON SEISMIC TSUNAMIS AND THE NEW ROLE OF GYROSCOPES IN ROTATIONAL SEISMOLOGY THIS BOOK CONTAINS SELECTED PAPERS PRESENTED AT THE NATO ADVANCED STUDY INSTITUTE ON STRONG GROUND MOTION SEISMOLOGY HELD IN ANKARA TURKEY BETWEEN JUNE 10 AND 21 1985 THE STRONG GROUND MOTION RESULTING FROM A MAJOR EARTHQUAKE DETERMINES THE LEVEL OF THE SEISMIC HAZARD TO ENABLE EARTHQUAKE ENGINEERS TO ASSESS THE STRUCTURAL PERFORMANCE AND THE CONSECUTIVE RISKS TO THE PROPERTY AND LIFE AS WELL AS PROVIDING DETAILED INFORMATION TO SEISMOLOGISTS ABOUT ITS SOURCE MECHANISM FROM THE EARTHQUAKE ENGINEERING POINT THE MAIN PROBLEM IS THE SPECIFICATION OF A DESIGN LEVEL GROUND MOTION FOR A GIVEN SOURCE SITE STRUCTURE ECONOMIC LIFE AND RISK COMBINATION THROUGH DETERMINISTIC AND PROBABILISTIC APPROACHES IN SEISMOLOGY THE STRONG MOTION DATA PROVIDE THE HIGH FREQUENCY INFORMATION TO DETERMINE THE RUPTURE PROCESS AND THE COMPLEXITY OF THE SOURCE MECHANISM THE EFFECTS OF THE PROPAGATION PATH ON THE STRONG GROUND MOTION IS A RESEARCH AREA RECEIVING SUBSTANTIAL ATTENUATION BOTH FROM EARTHQUAKE ENGINEERS AND SEISMOLOGISTS THE INSTITUTE PROVIDED A VENUE FOR THE TREATMENT OF THE SUBJECT MATTER BY A SERIES OF LECTURES ON EARTHQUAKE SOURCE MODELS AND NEAR FIELD THEORIES EFFECTS OF PROPAGATION PATHS AND SITE CONDITIONS NUMERICAL 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EARTHQUAKE THE BEST WAY TO MINIMIZE DAMAGE FROM EARTHQUAKES IS TO PREDICT THEIR LOCATION AND EFFECTS AND REINFORCE AGAINST THOSE POSSIBLE EFFECTS TOWARD THAT END THIS BOOK PRESENTS PREDICTION METHODS USEFUL FOR THE DESIGN OF EARTHQUAKE RESISTANT STRUCTURES IN THE FIRST OF TWO PARTS THE BOOK DEALS WITH ISSUES RELATING TO THE CHARACTERISATION AND THE RATIONAL DEFINITION OF SEISMIC INPUT IT BEGINS WITH A STUDY OF EARTHQUAKE RECORDS THAT LEADS TO THE IDENTIFICATION OF THEIR DAMAGE POTENTIAL PARAMETERS SUCH AS THE PEAK GROUND ACCELERATION AND THE STRONG MOTION DURATION SUBSEQUENT CHAPTERS CONCERN THEMSELVES WITH THE DETERMINISTIC AND PROBABILISTIC METHODOLOGIES FOR PRODUCING SEISMIC INPUTS FURTHER CHAPTERS ARE DEDICATED TO THE GENERATION OF ARTIFICIAL SEISMIC INPUT ON THE BASIS OF STOCHASTIC OR PROBABILISTIC APPROACHES THE SECOND PART OF THIS VOLUME DEALS WITH THE EFFECTS OF GROUND MOTION ON FOUNDATION ELEMENTS AND STRUCTURAL INTEGRITY PARTICULAR EMPHASIS IS GIVEN TO THE INTERACTION OF FOUNDATION PILES WITH VIBRATING SOILS HOMOGENEOUS OR HETEROGENEOUS THE FINAL TWO CHAPTERS ARE CONCERNED WITH THE POSSIBLE CONNECTION BETWEEN SOIL STRUCTURE INTERACTION SSI AND STRUCTURAL DAMAGE IN BOTH INSTANCES RECORDS OF ACTUAL EARTHQUAKE INDUCED MOTION ARE USED FOR SUCH ASSESSMENTS DESPITE ADVANCES IN THE FIELD OF GEOTECHNICAL EARTHQUAKE ENGINEERING EARTHQUAKES CONTINUE TO CAUSE LOSS OF LIFE AND PROPERTY IN ONE PART OF THE WORLD OR ANOTHER THE THIRD INTERNATIONAL CONFERENCE ON SOIL DYNAMICS AND EARTHQUAKE ENGINEERING PRINCETON UNIVERSITY PRINCETON NEW JERSEY USA 22ND TO 24TH JUNE 1987 PROVIDED AN OPPORTUNITY FOR PARTICIPANTS FROM ALL OVER THE WORLD TO SHARE THEIR EXPERTISE TO ENHANCE THE ROLE OF MECHANICS AND OTHER DISCIPLINES AS THEY RELATE TO EARTHQUAKE ENGINEERING THE EDITED PROCEEDINGS OF THE CONFERENCE ARE PUBLISHED IN FOUR VOLUMES THIS VOLUME COVERS SEISMICITY AND TECTONICS IN THE EASTERN MEDITERRANEAN SEISMIC WAVES IN SOILS AND GEOPHYSICAL METHODS ENGINEERING SEISMOLOGY DYNAMIC METHODS IN SOIL AND ROCK MECHANICS AND GROUND MOTION WITH ITS COMPANION VOLUMES IT IS HOPED THAT IT WILL CONTRIBUTE TO THE FURTHER DEVELOPMENT OF TECHNIQUES METHODS AND INNOVATIVE APPROACHES IN SOIL DYNAMICS AND EARTHQUAKE ENGINEERING THE ACCELERATED AND OFTEN UNCONTROLLED GROWTH OF THE CITIES HAS CONTRIBUTED TO THE ECOLOGICAL TRANSFORMATION OF THEIR IMMEDIATE SURROUNDINGS FACTORS CONTRIBUTING TO THE URBAN VULNERABILITY INCLUDE LOWERING OR RISING OF THE WATER TABLE SUBSIDENCE LOSS OF BEARING CAPACITY OF SOIL FOUNDATIONS AND INSTABILITY OF SLOPES RECENT CATASTROPHIC EARTHQUAKES HIGHLIGHT THE POOR UNDERSTANDING OF THE DECISION MAKERS OF SEISMIC RELATED RISK AS WELL AS THE TENDENCY OF SOME BUILDERS TO USE THE CHEAPEST MATERIALS AND TO INCREASE SHORT TERM ECONOMIC RETURNS ON THEIR INVESTMENT AND NOT TO TAKE INTO ACCOUNT THE COST OF RECONSTRUCTION OF DAMAGED STRUCTURES

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WILL CONTINUE TO INCREASE IF WE DO NOT SHIFT TOWARDS PROACTIVE SOLUTION DISASTER REDUCTION IS BOTH AN ISSUE FOR CONSIDERATION IN THE SUSTAINABLE DEVELOPMENT AGENDA AND A CROSS CUTTING ISSUE RELATING TO THE SOCIAL ECONOMIC ENVIRONMENTAL AND HUMANITARIAN SECTORS AS LOCATION IS THE KEY FACTOR WHICH DETERMINES THE LEVEL OF RISK ASSOCIATED WITH A HAZARD LAND USE PLANS AND MAPPING SHOULD BE USED AS TOOLS TO IDENTIFY THE MOST SUITABLE USAGE FOR VULNERABLE AREAS FOR PERFORMANCE BASED DESIGN NONLINEAR DYNAMIC STRUCTURAL ANALYSIS FOR VARIOUS TYPES OF INPUT GROUND MOTIONS IS REQUIRED STOCHASTIC SIMULATED GROUND MOTIONS ARE SOMETIMES USEFUL AS INPUT MOTIONS BECAUSE UNLIKE RECORDED MOTIONS THEY ARE NOT LIMITED IN NUMBER AND BECAUSE THEIR PROPERTIES CAN BE VARIED SYSTEMATICALLY TO STUDY THE IMPACT OF GROUND MOTION PROPERTIES ON STRUCTURAL RESPONSE THIS DISSERTATION DESCRIBES AN APPROACH BY WHICH THE WAVELET PACKET TRANSFORM CAN BE USED TO CHARACTERIZE COMPLEX TIME VARYING EARTHQUAKE GROUND MOTIONS AND IT ILLUSTRATES THE POTENTIAL BENEFITS OF SUCH AN APPROACH IN A VARIETY OF EARTHQUAKE ENGINEERING APPLICATIONS THE PROPOSED MODEL IS BASED ON THR AINSSON AND KIREMIDJIAN 2002 WHICH USE FOURIER AMPLITUDES AND PHASE DIFFERENCES TO SIMULATE GROUND MOTIONS AND ATTENUATION MODELS TO THEIR MODEL PARAMETERS WE EXTEND THEIR MODEL USING WAVELET PACKET TRANSFORM SINCE IT CAN CONTROL THE TIME AND FREQUENCY CHARACTERISTIC OF TIME SERIES THE TIME AND FREQUENCY VARYING PROPERTIES OF REAL GROUND MOTIONS CAN BE CAPTURED USING WAVELET PACKETS SO A MODEL IS DEVELOPED THAT REQUIRES ONLY 13 PARAMETERS TO DESCRIBE A GIVEN GROUND MOTION THESE 13 PARAMETERS ARE THEN RELATED TO SEISMOLOGICAL VARIABLES SUCH AS EARTHQUAKE MAGNITUDE DISTANCE AND SITE CONDITION THROUGH REGRESSION ANALYSIS THAT CAPTURES TRENDS IN MEAN VALUES STANDARD DEVIATIONS AND CORRELATIONS OF THESE PARAMETERS OBSERVED IN A LARGE DATABASE OF RECORDED STRONG GROUND MOTIONS THE RESULTING REGRESSION EQUATIONS THEN FORM A MODEL THAT CAN BE USED TO PREDICT GROUND MOTIONS FOR A FUTURE EARTHQUAKE SCENARIO THIS MODEL IS ANALOGOUS TO WIDELY USED EMPIRICAL GROUND MOTION PREDICTION MODELS FORMERLY CALLED ATTENUATION MODELS EXCEPT THAT THIS MODEL PREDICTS ENTIRE TIME SERIES RATHER THAN ONLY RESPONSE SPECTRA THE GROUND MOTIONS PRODUCED USING THIS PREDICTIVE MODEL ARE EXPLORED IN DETAIL AND ARE SHOWN TO HAVE ELASTIC RESPONSE SPECTRA INELASTIC RESPONSE SPECTRA DURATIONS MEAN PERIODS ETC THAT ARE CONSISTENT IN BOTH MEAN AND VARIABILITY TO EXISTING PUBLISHED PREDICTIVE MODELS FOR THOSE PROPERTIES THAT CONSISTENCY ALLOWS THE PROPOSED MODEL TO BE USED IN PLACE OF EXISTING MODELS FOR PROBABILISTIC SEISMIC HAZARD ANALYSIS PSHA CALCULATIONS THIS NEW WAY TO CALCULATE PSHA IS TERMED SIMULATION BASED PROBABILISTIC SEISMIC HAZARD ANALYSIS AND IT ALLOWS A DEEPER UNDERSTANDING OF GROUND MOTION HAZARD AND HAZARD DEAGGREGATION THAN IS POSSIBLE WITH TRADITIONAL PSHA BECAUSE IT PRODUCES A SUITE OF POTENTIAL GROUND MOTION TIME HISTORIES RATHER THAN 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SAN FERNANDO EARTHQUAKE AND TOPOGRAPHY OF THE SAN GABRIEL MOUNTAIN RANGE IT WAS FOUND THAT THE CONTOURS OF PEAK ACCELERATION AND PEAK VELOCITY GENERALLY FOLLOW THE TOPOGRAPHY OF THE SAN GABRIEL MOUNTAIN RANGE THE TOPOGRAPHICAL EFFECTS ON THE GROUND MOTION COULD BE INTERPRETED IN A SIMPLE MANNER AS A FUNCTION OF ELEVATION AND DIRECTION OF WAVE TRANSMISSION PATH THE ELEVATION AND DIRECTION BECOME THE DOMINANT FACTORS IN THE DISTRIBUTION OF THE GROUND MOTION IN THE NEAR FIELD A SIMPLE PRACTICAL METHOD FOR CALCULATING THE BEDROCK MOTION USING THE GROUND MOTION ELEVATION GRADIENT HAS BEEN APPLIED IN THE AREA SOUTH OF KAGEL MOUNTAIN AND NORTH OF SANTA MONICA MOUNTAIN IN THE SAN FERNANDO VALLEY THIS METHOD IS VALIDATED USING AFTER SHOCK DATA THIS GROUND MOTION ELEVATION GRADIENT METHOD WAS APPLIED TO AN AREA WHERE THE TOPOGRAPHY HAS ITS HIGHEST ELEVATION AT THE EPICENTRAL REGION AND DECREASES IN ELEVATION TO THE SURROUNDING LOCATIONS IN THE NEAR FIELD WITHIN 30 KM IN ANY CASE WHEN THE EPICENTER OCCURS AT AN ELEVATION LOWER THAN THE ELEVATION OF THE SURROUNDING AREA THIS GRADIENT METHOD MAY NOT BE APPLICABLE AND MUST BE TESTED FOR THIS ALTERNATE CONDITION THIS BOOK ADDRESSES CURRENT ACTIVITIES IN STRONG MOTION NETWORKS AROUND THE GLOBE COVERING ISSUES RELATED TO DESIGNING MAINTAINING AND DISSEMINATING INFORMATION FROM THESE ARRAYS THE BOOK IS DIVIDED INTO THREE PRINCIPAL SECTIONS THE FIRST SECTION INCLUDES RECENT DEVELOPMENTS IN REGIONAL AND GLOBAL GROUND MOTION PREDICTIVE MODELS IT PRESENTS DISCUSSIONS ON THE SIMILARITIES AND DIFFERENCES OF GROUND MOTION ESTIMATIONS FROM THESE MODELS AND THEIR APPLICATION TO DESIGN SPECTRA AS WELL AS OTHER NOVEL PROCEDURES FOR PREDICTING ENGINEERING PARAMETERS IN SEISMIC REGIONS WITH SPARSE DATA THE SECOND SECTION INTRODUCES TOPICS ABOUT THE PARTICULAR METHODOLOGIES BEING IMPLEMENTED IN THE RECENTLY ESTABLISHED GLOBAL AND REGIONAL STRONG MOTION DATABANKS IN EUROPE TO MAINTAIN AND DISSEMINATE THE ARCHIVED ACCELEROMETRIC DATA THE FINAL SECTION DESCRIBES MAJOR STRONG MOTION ARRAYS AROUND THE WORLD AND THEIR HISTORICAL DEVELOPMENTS THE LAST THREE CHAPTERS OF THIS SECTION INTRODUCE PROJECTS CARRIED OUT WITHIN THE CONTEXT OF ARRAYS DEPLOYED FOR SEISMIC RISK STUDIES IN METROPOLITAN AREAS AND HOW THIS MAY BE OF PARTICULAR INTEREST FOR RESEARCHERS WHO USE ACCELEROMETRIC DATA EXTENSIVELY AND BE REFERRED TO IN LINUX

EARTHQUAKE ENGINEERING AND ENGINEERING SEISMOLOGY ANALYSES GROUND MOTION DATA TAKEN AT THREE SITES IN MEXICO AND COMPARES ACCELEROGRAMS RECORDED IN MEXICO AND JAPAN STRONG GROUND MOTION MEASURING AND RECORDING INSTRUMENTS PLAY A MAJOR ROLE IN MITIGATION OF SEISMIC RISK THE STRONG GROUND MOTION NEAR THE SOURCE OF AN EARTHQUAKE DESCRIBES THE EFFECTS THAT ENDANGER OUR BUILT ENVIRONMENT AND IS ALSO THE MOST DETAILED CLUE CONCERNING THE SOURCE MECHANISM OF THE EARTHQUAKE THE RANGE OF COMPLEXITY THAT ENGULFS OUR UNDERSTANDING OF THE SOURCE PARAMETERS OF A MAJOR EARTHQUAKE EXTENT OF THE SOURCE MECHANISM STRESS DROP WAVE PROPAGATION PATTERNS AND HOW BUILDINGS AND OTHER WORKS OF CONSTRUCTION RESPOND TO GROUND TRANSMITTED DYNAMIC EFFECTS MAY BE OVERPOWERED BY IMPROVED DIRECT OBSERVATIONS STRONG MOTION SEISMOGRAPHS PROVIDE THE INFORMATION THAT ENABLES SCIENTISTS AND ENGINEERS TO RESOLVE THE MANY ISSUES THAT ARE INTERTWINED WITH PRACTICAL PROBLEMS OF BUILDING SAFE COMMUNITIES WORLDWIDE THEY MAY BE INSTALLED AS ARRAYS CLOSE TO MAJOR FAULT ZONES CONSISTING OF MANY INSTRUMENTS ARRANGED IN SOME GEOMETRICAL PATTERN OR IN THE VICINITY AND MOUNTED ON BUILDINGS THIS BOOK WHICH CONTAINS PAPERS BY INVITED AUTHORITIES REPRESENTS A UNIQUE INTERACTION BETWEEN SEISMOLOGISTS AND EARTHQUAKE ENGINEERS WHO EXAMINE ISSUES OF MUTUAL CONCERN IN AN OVERLAPPING AREA OF MAJOR INTEREST THE PAPERS HAVE BEEN GROUPED AROUND THREE MAJOR AREAS SEISMIC HAZARD AND EXTREME MOTIONS ENGINEERING USES OF STRONG MOTION SEISMOGRAMS ARRAYS AND OBSERVATIONS THE BOOK COVERS MULTI DISCIPLINARY TOPICS IN OBSERVATIONAL COMPUTATIONAL AND APPLIED GEOPHYSICS IN ASPECTS OF SOLID EARTH SYSTEM THE AUTHORS PROVIDE AN UP TO DATE OVERVIEW FOR METHODS AND TECHNIQUES IN SEISMOLOGY WITH A FOCUS ON FAULT STRUCTURE STRONG GROUND MOTION AND EARTHQUAKE FORECAST BASED ON FULL 3D EARTH STRUCTURE MODELS ABUNDANT OF CASE STUDIES MAKE IT A PRACTICAL REFERENCE FOR RESEARCHERS IN SEISMOLOGY AND APPLIED GEOPHYSICS FOR PERFORMANCE BASED DESIGN 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KINEMATIC DISLOCATION MODELS TO THE SYNTHESIS OF STRONG GROUND MOTION SUCH AS THE REPRESENTATION OF THE PREDICTED METHODS OF THEORETICAL AND SEMI EMPIRICAL SYNTHESIS A CHAPTER DEALS WITH DYNAMIC CRACKS WITH YOUR OWN 2D MODELING OF COMPLETE THREE DIMENSIONAL SEISMIC SIMULTANEOUS RUPTURE PROCESSES AND ENTERED IN THE UNIX

HOMOGENEOUS MEDIUM BUT ALSO IN A HOMOGENEOUS HALF SPACE OR HORIZONTALLY LAYERED MEDIUM THIS BOOK ALSO DESCRIBES A TOOL CAPABLE OF SYNTHESIZING STRONG MOTION RECORDS FROM A BASIC UNDERSTANDING OF FAULT MECHANICS AND SEISMIC WAVE PROPAGATION IN THE EARTH THE TEXT FURTHER EXAMINES THE CALCULATION OF GROUND MOTIONS AT LOCATIONS NEAR TO LARGE EARTHQUAKES THE CONCLUDING CHAPTER EXPLORES THE METHODS OF COMPUTING THE MOTIONS THAT RESULT FROM ELASTIC WAVES PROPAGATING THROUGH COMPLEX STRUCTURES THIS BOOK IS AN ADVANCED TEXT ON NUMERICAL MODELING FOR USE IN GRADUATE AND UPPER DIVISION COURSES IN PHYSICS GEOPHYSICS AND EARTHQUAKE ENGINEERING GEOPHYSICISTS USE SEISMIC SIGNALS TO IMAGE STRUCTURES IN THE EARTH S INTERIOR TO UNDERSTAND THE MECHANICS OF EARTHQUAKE AND VOLCANIC SOURCES AND TO ESTIMATE THEIR ASSOCIATED HAZARDS KEIITI AKI DEVELOPED PIONEERING QUANTITATIVE METHODS FOR EXTRACTING USEFUL INFORMATION FROM VARIOUS PORTIONS OF OBSERVED SEISMOGRAMS AND APPLIED THESE METHODS TO MANY PROBLEMS IN THE ABOVE FIELDS THIS VOLUME HONORS AKI S CONTRIBUTIONS WITH REVIEW PAPERS AND RESULTS FROM RECENT APPLICATIONS BY HIS FORMER STUDENTS AND SCIENTIFIC ASSOCIATES PERTAINING TO TOPICS SPAWNED BY HIS WORK DISCUSSED SUBJECTS INCLUDE ANALYTICAL AND NUMERICAL TECHNIQUES FOR CALCULATING DYNAMIC RUPTURE AND RADIATED SEISMIC WAVES STOCHASTIC MODELS USED IN ENGINEERING SEISMOLOGY EARTHQUAKE AND VOLCANIC SOURCE PROCESSES SEISMIC TOMOGRAPHY PROPERTIES OF LITHOSPHERIC STRUCTURES ANALYSIS OF SCATTERED WAVES AND MORE THE VOLUME WILL BE USEFUL TO STUDENTS AND PROFESSIONAL GEOPHYSICISTS ALIKE

## **EARTHQUAKE GROUND MOTION 2024-03-06**

EARTHQUAKE GROUND MOTION IS A COMPILATION OF TEN CHAPTERS COVERING TECTONICS SEISMICITY SITE EFFECTS TSUNAMIS INFRASTRUCTURE AND INSTRUMENTATION IT PRESENTS STATE OF THE ART TECHNIQUES FOR RETRIEVING RUPTURE MODELS SEISMOGENIC STRUCTURES AND VALIDATION OF FOCAL MECHANISMS IT ALSO PRESENTS MACROSEISMIC ARCHIVING TOOLS FOR HISTORICAL AND INSTRUMENTAL EARTHQUAKES AND THE FUNDAMENTALS OF SEISMIC TOMOGRAPHY THE BOOK DESCRIBES THE SITE RESPONSE ANALYSIS IN 2D AND 3D CONSIDERING TOPOGRAPHIC AND SOIL STRUCTURE INTERACTIONS ITS INCORPORATION IN A SEISMIC HAZARD ANALYSIS AND THE IMPACT OF EARTHQUAKES ON THE COST OF RECONSTRUCTION THE FINAL SECTIONS ARE DEVOTED TO THE GENESIS OF EARTHQUAKES TSUNAMIS NON SEISMIC TSUNAMIS AND THE NEW ROLE OF GYROSCOPES IN ROTATIONAL SEISMOLOGY

## ***STRONG GROUND MOTION SEISMOLOGY 2013-04-17***

THIS BOOK CONTAINS SELECTED PAPERS PRESENTED AT THE NATO ADVANCED STUDY INSTITUTE ON STRONG GROUND MOTION SEISMOLOGY HELD IN ANKARA TURKEY BETWEEN JUNE 10 AND 21 1985 THE STRONG GROUND MOTION RESULTING FROM A MAJOR EARTHQUAKE DETERMINES THE LEVEL OF THE SEISMIC HAZARD TO ENABLE EARTHQUAKE ENGINEERS TO ASSESS THE STRUCTURAL PERFORMANCE AND THE CONSECUTIVE RISKS TO THE PROPERTY AND LIFE AS WELL AS PROVIDING DETAILED INFORMATION TO SEISMOLOGISTS ABOUT ITS SOURCE MECHANISM FROM THE EARTHQUAKE ENGINEERING POINT THE MAIN PROBLEM IS THE SPECIFICATION OF A DESIGN LEVEL GROUND MOTION FOR A GIVEN SOURCE SITE STRUCTURE ECONOMIC LIFE AND RISK COMBINATION THROUGH DETERMINISTIC AND PROBABILISTIC APPROACHES IN SEISMOLOGY THE STRONG MOTION DATA PROVIDE THE HIGH FREQUENCY INFORMATION TO DETERMINE THE RUPTURE PROCESS AND THE COMPLEXITY OF THE SOURCE MECHANISM THE EFFECTS OF THE PROPAGATION PATH ON THE STRONG GROUND MOTION IS A RESEARCH AREA RECEIVING SUB STANTIAL ATTENUATION BOTH FROM EARTHQUAKE ENGINEERS AND SEISMOLOGISTS THE INSTITUTE PROVIDED A VENUE FOR THE TREATMENT OF THE SUBJECT MATTER BY A SERIES OF LECTURES ON EARTHQUAKE SOURCE MODELS AND NEAR FIELD THEORIES EFFECTS OF PROPAGATION PATHS AND SITE CONDITIONS NUMERICAL AND EMPIRICAL METHODS FOR PREDICTION DATA ACQUISITION AND ANALYSIS HAZARD ASSESSMENT AND ENGINEERING APPLICATION

## ***GROUND MOTION SEISMOLOGY 2021-01-04***

THIS BOOK EXPLAINS THE PHYSICS BEHIND SEISMIC GROUND MOTIONS AND SEISMIC WAVES TO GRADUATE AND UPPER UNDERGRADUATE STUDENTS AS WELL AS TO PROFESSIONALS BOTH SEISMIC GROUND MOTIONS AND SEISMIC WAVES ARE TERMS FOR SHAKING DUE TO EARTHQUAKES BUT IT IS COMMON THAT SHAKING IN THE NEAR FIELD OF AN EARTHQUAKE SOURCE IS CALLED SEISMIC GROUND MOTION AND IN THE FAR FIELD IS CALLED SEISMIC WAVES SEISMIC GROUND MOTION IS OFTEN DESCRIBED BY THE TENSOR FORMULA BASED ON THE REPRESENTATION THEOREM BUT IN THIS BOOK EXPLICIT FORMULATION IS EMPHASIZED BEGINNING WITH AUGUSTUS EDWARD HOUGH LOVE 1863 1940 THE BOOK ALSO EXPLAINS IN DEPTH THE EQUATIONS AND METHODS USED FOR ANALYSIS AND COMPUTATION OF SHAKING CLOSE TO AN EARTHQUAKE SOURCE IN ADDITION IT PROVIDES IN DETAIL INFORMATION AND KNOWLEDGE RELATED TO TELESEISMIC BODY WAVES WHICH ARE FREQUENTLY USED IN THE ANALYSIS OF THE SOURCE OF AN EARTHQUAKE

## **EARTHQUAKE GROUND MOTION 2014-09-29**

THE BEST WAY TO MINIMIZE DAMAGE FROM EARTHQUAKES IS TO PREDICT THEIR LOCATION AND EFFECTS AND REINFORCE AGAINST THOSE POSSIBLE EFFECTS TOWARD THAT END THIS BOOK PRESENTS PREDICTION METHODS USEFUL FOR THE DESIGN OF EARTHQUAKE RESISTANT STRUCTURES IN THE FIRST OF TWO PARTS THE BOOK DEALS WITH ISSUES RELATING TO THE CHARACTERISATION AND THE RATIONAL DEFINITION OF SEISMIC INPUT IT BEGINS WITH A STUDY OF EARTHQUAKE RECORDS THAT LEADS TO THE IDENTIFICATION OF THEIR DAMAGE POTENTIAL PARAMETERS SUCH AS THE PEAK GROUND ACCELERATION AND THE STRONG MOTION DURATION SUBSEQUENT CHAPTERS CONCERN THEMSELVES WITH THE DETERMINISTIC AND PROBABILISTIC METHODOLOGIES FOR PRODUCING SEISMIC INPUTS FURTHER CHAPTERS ARE DEDICATED TO THE GENERATION OF ARTIFICIAL SEISMIC INPUT ON THE BASIS OF STOCHASTIC OR PROBABILISTIC APPROACHES THE SECOND PART OF THIS VOLUME DEALS WITH THE EFFECTS OF GROUND MOTION ON FOUNDATION ELEMENTS AND STRUCTURAL INTEGRITY PARTICULAR EMPHASIS IS GIVEN TO THE INTERACTION OF FOUNDATION PILES WITH VIBRATING SOILS HOMOGENEOUS OR HETEROGENEOUS THE FINAL TWO CHAPTERS ARE CONCERNED WITH THE POSSIBLE CONNECTION BETWEEN SOIL STRUCTURE INTERACTION SSI AND STRUCTURAL DAMAGE IN BOTH INSTANCES RECORDS OF ACTUAL EARTHQUAKE INDUCED MOTION ARE USED FOR SUCH ASSESSMENTS

## **EARTHQUAKE MOTION AND GROUND CONDITIONS 1993**

DESPITE ADVANCES IN THE FIELD OF GEOTECHNICAL EARTHQUAKE ENGINEERING EARTHQUAKES CONTINUE TO CAUSE LOSS OF LIFE

AND PROPERTY IN ONE PART OF THE WORLD OR ANOTHER THE THIRD INTERNATIONAL CONFERENCE ON SOIL DYNAMICS AND EARTHQUAKE ENGINEERING PRINCETON UNIVERSITY PRINCETON NEW JERSEY USA 22ND TO 24TH JUNE 1987 PROVIDED AN OPPORTUNITY FOR PARTICIPANTS FROM ALL OVER THE WORLD TO SHARE THEIR EXPERTISE TO ENHANCE THE ROLE OF MECHANICS AND OTHER DISCIPLINES AS THEY RELATE TO EARTHQUAKE ENGINEERING THE EDITED PROCEEDINGS OF THE CONFERENCE ARE PUBLISHED IN FOUR VOLUMES THIS VOLUME COVERS SEISMICITY AND TECTONICS IN THE EASTERN MEDITERRANEAN SEISMIC WAVES IN SOILS AND GEOPHYSICAL METHODS ENGINEERING SEISMOLOGY DYNAMIC METHODS IN SOIL AND ROCK MECHANICS AND GROUND MOTION WITH ITS COMPANION VOLUMES IT IS HOPED THAT IT WILL CONTRIBUTE TO THE FURTHER DEVELOPMENT OF TECHNIQUES METHODS AND INNOVATIVE APPROACHES IN SOIL DYNAMICS AND EARTHQUAKE ENGINEERING

## GROUND MOTION AND ENGINEERING SEISMOLOGY 2015-08-11

THE ACCELERATED AND OFTEN UNCONTROLLED GROWTH OF THE CITIES HAS CONTRIBUTED TO THE ECOLOGICAL TRANSFORMATION OF THEIR IMMEDIATE SURROUNDINGS FACTORS CONTRIBUTING TO THE URBAN VULNERABILITY INCLUDE LOWERING OR RISING OF THE WATER TABLE SUBSIDENCE LOSS OF BEARING CAPACITY OF SOIL FOUNDATIONS AND INSTABILITY OF SLOPES RECENT CATASTROPHIC EARTHQUAKES HIGHLIGHT THE POOR UNDERSTANDING BY DECISION MAKERS OF SEISMIC RELATED RISK AS WELL AS THE TENDENCY OF SOME BUILDERS TO USE THE CHEAPEST DESIGNS AND CONSTRUCTION MATERIALS TO INCREASE SHORT TERM ECONOMIC RETURNS ON THEIR INVESTMENT LOSSES FROM EARTHQUAKES WILL CONTINUE TO INCREASE IF WE DO NOT SHIFT TOWARDS PROACTIVE SOLUTION DISASTER REDUCTION IS BOTH AN ISSUE FOR CONSIDERATION IN THE SUSTAINABLE DEVELOPMENT AGENDA AND A CROSS CUTTING ISSUE RELATING TO THE SOCIAL ECONOMIC ENVIRONMENTAL AND HUMANITARIAN SECTORS AS LOCATION IS THE KEY FACTOR WHICH DETERMINES THE LEVEL OF RISK ASSOCIATED WITH A HAZARD LAND USE PLANS AND MAPPING SHOULD BE USED AS TOOLS TO IDENTIFY THE MOST SUITABLE USAGE FOR VULNERABLE AREAS

## STATE-OF-THE-ART STUDY CONCERNING NEAR-FIELD EARTHQUAKE GROUND MOTION 1981

FOR PERFORMANCE BASED DESIGN NONLINEAR DYNAMIC STRUCTURAL ANALYSIS FOR VARIOUS TYPES OF INPUT GROUND MOTIONS IS REQUIRED STOCHASTIC SIMULATED GROUND MOTIONS ARE SOMETIMES USEFUL AS INPUT MOTIONS BECAUSE UNLIKE RECORDED MOTIONS THEY ARE NOT LIMITED IN NUMBER AND BECAUSE THEIR PROPERTIES CAN BE VARIED SYSTEMATICALLY TO STUDY THE IMPACT OF GROUND MOTION PROPERTIES ON STRUCTURAL RESPONSE THIS DISSERTATION DESCRIBES AN APPROACH BY WHICH THE WAVELET PACKET TRANSFORM CAN BE USED TO CHARACTERIZE COMPLEX TIME VARYING EARTHQUAKE GROUND MOTIONS AND IT ILLUSTRATES THE POTENTIAL BENEFITS OF SUCH AN APPROACH IN A VARIETY OF EARTHQUAKE ENGINEERING APPLICATIONS THE PROPOSED MODEL IS BASED ON THR AINSSON AND KIREMIDJIAN 2002 WHICH USE FOURIER AMPLITUDES AND PHASE DIFFERENCES TO SIMULATE GROUND MOTIONS AND ATTENUATION MODELS TO THEIR MODEL PARAMETERS WE EXTEND THEIR MODEL USING WAVELET PACKET TRANSFORM SINCE IT CAN CONTROL THE TIME AND FREQUENCY CHARACTERISTIC OF TIME SERIES THE TIME AND FREQUENCY VARYING PROPERTIES OF REAL GROUND MOTIONS CAN BE CAPTURED USING WAVELET PACKETS SO A MODEL IS DEVELOPED THAT REQUIRES ONLY 13 PARAMETERS TO DESCRIBE A GIVEN GROUND MOTION THESE 13 PARAMETERS ARE THEN RELATED TO SEISMOLOGICAL VARIABLES SUCH AS EARTHQUAKE MAGNITUDE DISTANCE AND SITE CONDITION THROUGH REGRESSION ANALYSIS THAT CAPTURES TRENDS IN MEAN VALUES STANDARD DEVIATIONS AND CORRELATIONS OF THESE PARAMETERS OBSERVED IN A LARGE DATABASE OF RECORDED STRONG GROUND MOTIONS THE RESULTING REGRESSION EQUATIONS THEN FORM A MODEL THAT CAN BE USED TO PREDICT GROUND MOTIONS FOR A FUTURE EARTHQUAKE SCENARIO THIS MODEL IS ANALOGOUS TO WIDELY USED EMPIRICAL GROUND MOTION PREDICTION MODELS FORMERLY CALLED ATTENUATION MODELS EXCEPT THAT THIS MODEL PREDICTS ENTIRE TIME SERIES RATHER THAN ONLY RESPONSE SPECTRA THE GROUND MOTIONS PRODUCED USING THIS PREDICTIVE MODEL ARE EXPLORED IN DETAIL AND ARE SHOWN TO HAVE ELASTIC RESPONSE SPECTRA INELASTIC RESPONSE SPECTRA DURATIONS MEAN PERIODS ETC THAT ARE CONSISTENT IN BOTH MEAN AND VARIABILITY TO EXISTING PUBLISHED PREDICTIVE MODELS FOR THOSE PROPERTIES THAT CONSISTENCY ALLOWS THE PROPOSED MODEL TO BE USED IN PLACE OF EXISTING MODELS FOR PROBABILISTIC SEISMIC HAZARD ANALYSIS PSHA CALCULATIONS THIS NEW WAY TO CALCULATE PSHA IS TERMED SIMULATION BASED PROBABILISTIC SEISMIC HAZARD ANALYSIS AND IT ALLOWS A DEEPER UNDERSTANDING OF GROUND MOTION HAZARD AND HAZARD DEAGGREGATION THAN IS POSSIBLE WITH TRADITIONAL PSHA BECAUSE IT PRODUCES A SUITE OF POTENTIAL GROUND MOTION TIME HISTORIES RATHER THAN SIMPLY A DISTRIBUTION OF RESPONSE SPECTRA THE POTENTIAL BENEFITS OF THIS APPROACH ARE DEMONSTRATED AND EXPLORED IN DETAIL TAKING THIS ANALYSIS EVEN FURTHER THIS SUITE OF TIME HISTORIES CAN BE USED AS INPUT FOR NONLINEAR DYNAMIC ANALYSIS OF STRUCTURES TO PERFORM A RISK ANALYSIS I E PROBABILISTIC SEISMIC DEMAND ANALYSIS THAT ALLOWS COMPUTATION OF THE PROBABILITY OF THE STRUCTURE EXCEEDING SOME LEVEL OF RESPONSE IN A FUTURE EARTHQUAKE THESE RISK CALCULATIONS ARE OFTEN PERFORMED TODAY USING SMALL SETS OF SCALED RECORDED GROUND MOTIONS BUT THAT APPROACH REQUIRES A VARIETY OF ASSUMPTIONS REGARDING IMPORTANT PROPERTIES OF GROUND MOTIONS THE IMPACTS OF GROUND MOTION SCALING ETC THE APPROACH PROPOSED HERE FACILITATES EXAMINATION OF THOSE ASSUMPTIONS AND PROVIDES A VARIETY OF OTHER RELEVANT INFORMATION NOT OBTAINABLE BY THAT TRADITIONAL APPROACH

## **SEISMIC GROUND MOTION IN LARGE URBAN AREAS 2012-12-06**

THIS STUDY ATTEMPTS TO DETERMINE SITE EFFECTS ON EARTHQUAKE GROUND MOTION AND THE CORRELATION BETWEEN ACCELERATION AND OR VELOCITY GENERATED DURING THE SAN FERNANDO EARTHQUAKE AND TOPOGRAPHY OF THE SAN GABRIEL MOUNTAIN RANGE IT WAS FOUND THAT THE CONTOURS OF PEAK ACCELERATION AND PEAK VELOCITY GENERALLY FOLLOW THE TOPOGRAPHY OF THE SAN GABRIEL MOUNTAIN RANGE THE TOPOGRAPHICAL EFFECTS ON THE GROUND MOTION COULD BE INTERPRETED IN A SIMPLE MANNER AS A FUNCTION OF ELEVATION AND DIRECTION OF WAVE TRANSMISSION PATH THE ELEVATION AND DIRECTION BECOME THE DOMINANT FACTORS IN THE DISTRIBUTION OF THE GROUND MOTION IN THE NEAR FIELD A SIMPLE PRACTICAL METHOD FOR CALCULATING THE BEDROCK MOTION USING THE GROUND MOTION ELEVATION GRADIENT HAS BEEN APPLIED IN THE AREA SOUTH OF KAGEL MOUNTAIN AND NORTH OF SANTA MONICA MOUNTAIN IN THE SAN FERNANDO VALLEY THIS METHOD IS VALIDATED USING AFTER SHOCK DATA THIS GROUND MOTION ELEVATION GRADIENT METHOD WAS APPLIED TO AN AREA WHERE THE TOPOGRAPHY HAS ITS HIGHEST ELEVATION AT THE EPICENTRAL REGION AND DECREASES IN ELEVATION TO THE SURROUNDING LOCATIONS IN THE NEAR FIELD WITHIN 30 KM IN ANY CASE WHEN THE EPICENTER OCCURS AT AN ELEVATION LOWER THAN THE ELEVATION OF THE SURROUNDING AREA THIS GRADIENT METHOD MAY NOT BE APPLICABLE AND MUST BE TESTED FOR THIS ALTERNATE CONDITION

## ***STRONG GROUND MOTION 1978***

THIS BOOK ADDRESSES CURRENT ACTIVITIES IN STRONG MOTION NETWORKS AROUND THE GLOBE COVERING ISSUES RELATED TO DESIGNING MAINTAINING AND DISSEMINATING INFORMATION FROM THESE ARRAYS THE BOOK IS DIVIDED INTO THREE PRINCIPAL SECTIONS THE FIRST SECTION INCLUDES RECENT DEVELOPMENTS IN REGIONAL AND GLOBAL GROUND MOTION PREDICTIVE MODELS IT PRESENTS DISCUSSIONS ON THE SIMILARITIES AND DIFFERENCES OF GROUND MOTION ESTIMATIONS FROM THESE MODELS AND THEIR APPLICATION TO DESIGN SPECTRA AS WELL AS OTHER NOVEL PROCEDURES FOR PREDICTING ENGINEERING PARAMETERS IN SEISMIC REGIONS WITH SPARSE DATA THE SECOND SECTION INTRODUCES TOPICS ABOUT THE PARTICULAR METHODOLOGIES BEING IMPLEMENTED IN THE RECENTLY ESTABLISHED GLOBAL AND REGIONAL STRONG MOTION DATABANKS IN EUROPE TO MAINTAIN AND DISSEMINATE THE ARCHIVED ACCELEROMETRIC DATA THE FINAL SECTION DESCRIBES MAJOR STRONG MOTION ARRAYS AROUND THE WORLD AND THEIR HISTORICAL DEVELOPMENTS THE LAST THREE CHAPTERS OF THIS SECTION INTRODUCE PROJECTS CARRIED OUT WITHIN THE CONTEXT OF ARRAYS DEPLOYED FOR SEISMIC RISK STUDIES IN METROPOLITAN AREAS AUDIENCE THIS TIMELY BOOK WILL BE OF PARTICULAR INTEREST FOR RESEARCHERS WHO USE ACCELEROMETRIC DATA EXTENSIVELY TO CONDUCT STUDIES IN EARTHQUAKE ENGINEERING AND ENGINEERING SEISMOLOGY

## **STOCHASTIC MODEL FOR EARTHQUAKE GROUND MOTION USING WAVELET PACKETS 2011**

ANALYSES GROUND MOTION DATA TAKEN AT THREE SITES IN MEXICO AND COMPARES ACCELEROGRAMS RECORDED IN MEXICO AND JAPAN

## **EARTHQUAKE GROUND MOTION AND ITS EFFECTS ON STRUCTURES 1982**

STRONG GROUND MOTION MEASURING AND RECORDING INSTRUMENTS PLAY A MAJOR ROLE IN MITIGATION OF SEISMIC RISK THE STRONG GROUND MOTION NEAR THE SOURCE OF AN EARTHQUAKE DESCRIBES THE EFFECTS THAT ENDANGER OUR BUILT ENVIRONMENT AND IS ALSO THE MOST DETAILED CLUE CONCERNING THE SOURCE MECHANISM OF THE EARTHQUAKE THE RANGE OF COMPLEXITY THAT ENGULFS OUR UNDERSTANDING OF THE SOURCE PARAMETERS OF A MAJOR EARTHQUAKE EXTENT OF THE SOURCE MECHANISM STRESS DROP WAVE PROPAGATION PATTERNS AND HOW BUILDINGS AND OTHER WORKS OF CONSTRUCTION RESPOND TO GROUND TRANSMITTED DYNAMIC EFFECTS MAY BE OVERPOWERED BY IMPROVED DIRECT OBSERVATIONS STRONG MOTION SEISMOGRAPHS PROVIDE THE INFORMATION THAT ENABLES SCIENTISTS AND ENGINEERS TO RESOLVE THE MANY ISSUES THAT ARE INTERTWINED WITH PRACTICAL PROBLEMS OF BUILDING SAFE COMMUNITIES WORLDWIDE THEY MAY BE INSTALLED AS ARRAYS CLOSE TO MAJOR FAULT ZONES CONSISTING OF MANY INSTRUMENTS ARRANGED IN SOME GEOMETRICAL PATTERN OR IN THE VICINITY AND MOUNTED ON BUILDINGS THIS BOOK WHICH CONTAINS PAPERS BY INVITED AUTHORITIES REPRESENTS A UNIQUE INTERACTION BETWEEN SEISMOLOGISTS AND EARTHQUAKE ENGINEERS WHO EXAMINE ISSUES OF MUTUAL CONCERN IN AN OVERLAPPING AREA OF MAJOR INTEREST THE PAPERS HAVE BEEN GROUPED AROUND THREE MAJOR AREAS SEISMIC HAZARD AND EXTREME MOTIONS ENGINEERING USES OF STRONG MOTION SEISMOGRAMS ARRAYS AND OBSERVATIONS

## **PROCEDURES FOR ESTIMATING EARTHQUAKE GROUND MOTIONS 1980**

THE BOOK COVERS MULTI DISCIPLINARY TOPICS IN OBSERVATIONAL COMPUTATIONAL AND APPLIED GEOPHYSICS IN ASPECTS OF SOLID EARTH SYSTEM THE AUTHORS PROVIDE AN UP TO DATE OVERVIEW FOR METHODS AND TECHNIQUES IN SEISMOLOGY WITH

## **INFLUENCE OF LOCAL GEOLOGY ON EARTHQUAKE GROUND MOTION 1969**

FOR PERFORMANCE BASED DESIGN NONLINEAR DYNAMIC STRUCTURAL ANALYSIS FOR VARIOUS TYPES OF INPUT GROUND MOTIONS IS REQUIRED STOCHASTIC SIMULATED GROUND MOTIONS ARE SOMETIMES USEFUL AS INPUT MOTIONS BECAUSE UNLIKE RECORDED MOTIONS THEY ARE NOT LIMITED IN NUMBER AND BECAUSE THEIR PROPERTIES CAN BE VARIED SYSTEMATICALLY TO STUDY THE IMPACT OF GROUND MOTION PROPERTIES ON STRUCTURAL RESPONSE THIS DISSERTATION DESCRIBES AN APPROACH BY WHICH THE WAVELET PACKET TRANSFORM CAN BE USED TO CHARACTERIZE COMPLEX TIME VARYING EARTHQUAKE GROUND MOTIONS AND IT ILLUSTRATES THE POTENTIAL BENEFITS OF SUCH AN APPROACH IN A VARIETY OF EARTHQUAKE ENGINEERING APPLICATIONS THE PROPOSED MODEL IS BASED ON THRE<sup>[2]</sup> INSSON AND KIREMIDJIAN 2002 WHICH USE FOURIER AMPLITUDES AND PHASE DIFFERENCES TO SIMULATE GROUND MOTIONS AND ATTENUATION MODELS TO THEIR MODEL PARAMETERS WE EXTEND THEIR MODEL USING WAVELET PACKET TRANSFORM SINCE IT CAN CONTROL THE TIME AND FREQUENCY CHARACTERISTIC OF TIME SERIES THE TIME AND FREQUENCY VARYING PROPERTIES OF REAL GROUND MOTIONS CAN BE CAPTURED USING WAVELET PACKETS SO A MODEL IS DEVELOPED THAT REQUIRES ONLY 13 PARAMETERS TO DESCRIBE A GIVEN GROUND MOTION THESE 13 PARAMETERS ARE THEN RELATED TO SEISMOLOGICAL VARIABLES SUCH AS EARTHQUAKE MAGNITUDE DISTANCE AND SITE CONDITION THROUGH REGRESSION ANALYSIS THAT CAPTURES TRENDS IN MEAN VALUES STANDARD DEVIATIONS AND CORRELATIONS OF THESE PARAMETERS OBSERVED IN A LARGE DATABASE OF RECORDED STRONG GROUND MOTIONS THE RESULTING REGRESSION EQUATIONS THEN FORM A MODEL THAT CAN BE USED TO PREDICT GROUND MOTIONS FOR A FUTURE EARTHQUAKE SCENARIO THIS MODEL IS ANALOGOUS TO WIDELY USED EMPIRICAL GROUND MOTION PREDICTION MODELS FORMERLY CALLED ATTENUATION MODELS EXCEPT THAT THIS MODEL PREDICTS ENTIRE TIME SERIES RATHER THAN ONLY RESPONSE SPECTRA THE GROUND MOTIONS PRODUCED USING THIS PREDICTIVE MODEL ARE EXPLORED IN DETAIL AND ARE SHOWN TO HAVE ELASTIC RESPONSE SPECTRA INELASTIC RESPONSE SPECTRA DURATIONS MEAN PERIODS ETC THAT ARE CONSISTENT IN BOTH MEAN AND VARIABILITY TO EXISTING PUBLISHED PREDICTIVE MODELS FOR THOSE PROPERTIES THAT CONSISTENCY ALLOWS THE PROPOSED MODEL TO BE USED IN PLACE OF EXISTING MODELS FOR PROBABILISTIC SEISMIC HAZARD ANALYSIS PSHA CALCULATIONS THIS NEW WAY TO CALCULATE PSHA IS TERMED SIMULATION BASED PROBABILISTIC SEISMIC HAZARD ANALYSIS AND IT ALLOWS A DEEPER UNDERSTANDING OF GROUND MOTION HAZARD AND HAZARD DEAGGREGATION THAN IS POSSIBLE WITH TRADITIONAL PSHA BECAUSE IT PRODUCES A SUITE OF POTENTIAL GROUND MOTION TIME HISTORIES RATHER THAN SIMPLY A DISTRIBUTION OF RESPONSE SPECTRA THE POTENTIAL BENEFITS OF THIS APPROACH ARE DEMONSTRATED AND EXPLORED IN DETAIL TAKING THIS ANALYSIS EVEN FURTHER THIS SUITE OF TIME HISTORIES CAN BE USED AS INPUT FOR NONLINEAR DYNAMIC ANALYSIS OF STRUCTURES TO PERFORM A RISK ANALYSIS I E PROBABILISTIC SEISMIC DEMAND ANALYSIS THAT ALLOWS COMPUTATION OF THE PROBABILITY OF THE STRUCTURE EXCEEDING SOME LEVEL OF RESPONSE IN A FUTURE EARTHQUAKE THESE RISK CALCULATIONS ARE OFTEN PERFORMED TODAY USING SMALL SETS OF SCALED RECORDED GROUND MOTIONS BUT THAT APPROACH REQUIRES A VARIETY OF ASSUMPTIONS REGARDING IMPORTANT PROPERTIES OF GROUND MOTIONS THE IMPACTS OF GROUND MOTION SCALING ETC THE APPROACH PROPOSED HERE FACILITATES EXAMINATION OF THOSE ASSUMPTIONS AND PROVIDES A VARIETY OF OTHER RELEVANT INFORMATION NOT OBTAINABLE BY THAT TRADITIONAL APPROACH

## **CHARACTERISTICS OF THE STRONG GROUND MOTION RECORDED DURING THE OCTOBER 15, 1979 IMPERIAL VALLEY EARTHQUAKE 1984**

SEISMIC STRONG MOTION SYNTHETICS DESCRIBES THE METHODS OF MODELING THE PRODUCTION OF STRONG SEISMIC GROUND MOTIONS BY REALISTIC SEISMIC SOURCES ORGANIZED INTO SIX CHAPTERS THIS BOOK HIGHLIGHTS THE DIFFERENT WAYS OF NUMERICAL TREATMENT AND THE AVAILABLE COMPUTATIONALLY RAPID AND CONCEPTUALLY SIMPLE ALGORITHMS THE INTRODUCTORY CHAPTER DESCRIBES THE INTENSE BURSTS OF RADIATION EMITTED DURING SUDDEN CHANGES IN THE RUPTURE FRONT VELOCITY OCCURRING WHEN THE ZONE OF SLIP REACHES REGIONS OF DIFFERING STRESS DROP THIS TOPIC IS FOLLOWED BY AN OVERVIEW OF THE OBSERVATIONS OF SEISMIC WAVES CLOSE TO THE FAULT AND A DISCUSSION ON THE APPLICATION OF KINEMATIC DISLOCATION MODELS TO THE SYNTHESIS OF STRONG GROUND MOTION SUCH AS THE REPRESENTATION THEOREM AND METHODS OF THEORETICAL AND SEMI EMPIRICAL SYNTHESIS A CHAPTER DEALS WITH DYNAMIC SHEAR CRACKS WITH AN EMPHASIS ON NUMERICAL MODELING OF COMPLETE THREE DIMENSIONAL SPONTANEOUS RUPTURE PROCESSES NOT ONLY IN AN INFINITE HOMOGENEOUS MEDIUM BUT ALSO IN A HOMOGENEOUS HALF SPACE OR HORIZONTALLY LAYERED MEDIUM THIS BOOK ALSO DESCRIBES A TOOL CAPABLE OF SYNTHESIZING STRONG MOTION RECORDS FROM A BASIC UNDERSTANDING OF FAULT MECHANICS AND SEISMIC WAVE PROPAGATION IN THE EARTH THE TEXT FURTHER EXAMINES THE CALCULATION OF GROUND MOTIONS AT LOCATIONS NEAR TO LARGE EARTHQUAKES THE CONCLUDING CHAPTER EXPLORES THE METHODS OF COMPUTING THE MOTIONS THAT RESULT FROM ELASTIC WAVES PROPAGATING THROUGH COMPLEX STRUCTURES THIS BOOK IS AN ADVANCED TEXT ON NUMERICAL MODELING FOR USE IN GRADUATE AND UPPER DIVISION COURSES IN PHYSICS GEOPHYSICS AND EARTHQUAKE ENGINEERING



## STRONG MOTION EARTHQUAKE ACCELEROGRAMS INDEX VOLUME 1976

GEOPHYSICISTS USE SEISMIC SIGNALS TO IMAGE STRUCTURES IN THE EARTH'S INTERIOR TO UNDERSTAND THE MECHANICS OF EARTHQUAKE AND VOLCANIC SOURCES AND TO ESTIMATE THEIR ASSOCIATED HAZARDS KEIITI AKI DEVELOPED PIONEERING QUANTITATIVE METHODS FOR EXTRACTING USEFUL INFORMATION FROM VARIOUS PORTIONS OF OBSERVED SEISMOGRAMS AND APPLIED THESE METHODS TO MANY PROBLEMS IN THE ABOVE FIELDS THIS VOLUME HONORS AKI'S CONTRIBUTIONS WITH REVIEW PAPERS AND RESULTS FROM RECENT APPLICATIONS BY HIS FORMER STUDENTS AND SCIENTIFIC ASSOCIATES PERTAINING TO TOPICS SPAWNED BY HIS WORK DISCUSSED SUBJECTS INCLUDE ANALYTICAL AND NUMERICAL TECHNIQUES FOR CALCULATING DYNAMIC RUPTURE AND RADIATED SEISMIC WAVES STOCHASTIC MODELS USED IN ENGINEERING SEISMOLOGY EARTHQUAKE AND VOLCANIC SOURCE PROCESSES SEISMIC TOMOGRAPHY PROPERTIES OF LITHOSPHERIC STRUCTURES ANALYSIS OF SCATTERED WAVES AND MORE THE VOLUME WILL BE USEFUL TO STUDENTS AND PROFESSIONAL GEOPHYSICISTS ALIKE

## **SIMULATION OF EARTHQUAKE GROUND MOTION ON A MICROCOMPUTER 1985**

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## **ESTIMATION OF GROUND MOTION PARAMETERS 1978**

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## **METHODS FOR PREDICTION OF STRONG EARTHQUAKE GROUND MOTION 1979**

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## **COMPILATION, ASSESSMENT AND EXPANSION OF THE STRONG EARTHQUAKE GROUND MOTION DATA BASE 1980**

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*STOCHASTIC MODEL FOR EARTHQUAKE GROUND MOTION USING WAVELET PACKETS*  
2011

**SEISMIC STRONG MOTION SYNTHETICS 2012-12-02**

*SEISMIC MOTION, LITHOSPHERIC STRUCTURES, EARTHQUAKE AND VOLCANIC  
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