

Ellen Gottschämmer (Autor) Kinematic and Dynamic Simulation of Ground Motion: Implications for Seismic Hazard Assessment Verbesserung der seismischen Gefährdungsabschätzung durch kinematische und dynamische Modellierung seismischer Bodenbewegung

Ellen Gottschämmer Kinematic and Dynamic Simulation of Ground Motion: Implications for Seismic Hazard Assessment

W Cuvillier Verlag Göttingen

https://cuvillier.de/de/shop/publications/3597

Copyright: Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen, Germany Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: https://cuvillier.de

Contents

Introduction							
1	Concepts of Finite Difference Modeling						
	1.1	Stabili	ity of a System	21			
	1.2	Numer	rical Dispersion	22			
	1.3	Stagge	ered Grids and Accuracy of the System	22			
	1.4	Latera	l and Bottom Boundaries	23			
	1.5	Free-Surface Boundary-Condition					
	1.6	Impler	mentation of the Source	25			
		1.6.1	Kinematic Ruptures	25			
		1.6.2	Dynamic Ruptures	28			
2	Case Study I: Rhinegraben-Earthquakes						
	2.1	Motiva	ation	31			
	2.2	Upper	Rhinegraben	32			
		2.2.1	Tectonics and Geology	32			
		2.2.2	Seismicity	33			
		2.2.3	Three Rhinegraben Earthquakes $(M_L \ 3.5 - 3.6)$	33			
	2.3 Modeling Parameters		ing Parameters	35			
		2.3.1	Elastic Model and Geometry	35			
		2.3.2	Computational Parameters	37			
	2.4	Numer	rical Results	38			
		2.4.1	Arrival Times of P-Waves	39			
		2.4.2	Peak Ground Velocities	40			
		2.4.3	Amplitude Ratios	42			
		2.4.4	Duration of Shaking	44			
		2.4.5	Response Spectra	44			
	2.5	Discus	sion	45			

3	Cas	e Stud	ly II: The 1927 Jericho Earthquake	51		
	3.1	Motiv	ation	51		
	3.2	Dead	Sea Rift Transform Fault	52		
		3.2.1	Tectonics and Geology	52		
		3.2.2	Seismicity	52		
		3.2.3	The 1927 Jericho Earthquake	52		
	3.3	Mode	ling Parameters	54		
		3.3.1	Elastic Model and Geometry	54		
		3.3.2	Computational Parameters	55		
	3.4	Nume	rical Results	56		
		3.4.1	Snapshots of the Wavefield	56		
		3.4.2	Seismograms	57		
		3.4.3	Peak Ground Velocities	58		
		3.4.4	Spectral Accelerations	59		
	3.5	Discus	ssion	62		
4	Case Study III: Earthquakes on Dipping Faults					
	4.1	Motiv	ation	65		
	4.2	Mode	ling Parameters	67		
		4.2.1	Elastic Model and Geometry	67		
		4.2.2	Dynamic Computational Parameters	67		
		4.2.3	Kinematic Computational Parameters	69		
	4.3	Numerical Results				
		4.3.1	Uniform Halfspace (UHS) Model	70		
		4.3.2	Layered Model, 45° Dipping Thrust Fault $\ldots \ldots \ldots \ldots$	75		
		4.3.3	Variation of Initial Stress Distribution	79		
		4.3.4	Deeper Versus Shallower Events	86		
	4.4	Discus	ssion	87		
Su	ımm	ary		89		
A	Free-Surface Boundary-Condition					
	A.1	Explic	tit Free-Surface Boundary-Condition	96		
		A.1.1	Free-Surface Boundary-Condition FS1	96		
		A.1.2	Free-Surface Boundary-Condition FS2	97		
	A.2	Source	e and Receiver Configuration and Model Description	98		
	A.3	Numerical Results				

CONTENTS	3			
A.3.1 A.3.2	Comparison Between FS1 and FS2			
Bibliography				
Acknowledgements 1				
Lebenslauf				