

Advanced
Rock Dynamics
and Applications

NAVODITA BHATNAGAR



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Rock dynamics is a branch of rock mechanics and engineering which essentially deals with the response of rock masses to various dynamic loading conditions including vibrations from earthquakes and explosions. The studies also encompass formation and propagation of dynamic loads, rock failures under dynamic and static loads, responses and transmission. In the last few decades, experimental and computational techniques have seen a tremendous development thus allowing capturing the progress of fracture in microsecond steps, understanding the initiation, propagation, and branching of fracture, thus leading better research and development of new theories. Rock dynamics is useful in civil and geological engineering studies as well but the presence of fourth dimension, that is time, makes it a bit difficult to understand and apply. The book includes research dealing with rock dynamics theory, rockfall hazards, earth surface dynamics and geomorphometry. Rockfalls and landslides have been given special focus by including case histories which also discuss about risk assessment. I hope it will be insightful for the readers and help them understand the subject in depth.



Navodita Bhatnagar finished her masters in technology and currently pursuing her PhD in environmental sciences from Institute of Technology, Carlow, Ireland. She's a keen enthusiast of environment protection and management. An alumunus of Indo-German centre for sustainability which is essentially a collaborative interface to gather scientists in the field of environment sciences to come together and work for the common cause which is environment protection.



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Preface

Rock dynamics is a branch of rock mechanics and engineering which essentially deals with the response of rock masses to various dynamic loading conditions including vibrations from earthquakes and explosions. The studies also encompass formation and propagation of dynamic loads, rock failures under dynamic and static loads, responses and transmission. In the last few decades, experimental and computational techniques have seen a tremendous development thus allowing capturing the progress of fracture in microsecond steps, understanding the initiation, propagation, and branching of fracture, thus leading better research and development of new theories. Rock dynamics is useful in civil and geological engineering studies as well but the presence of fourth dimension, that is time, makes it a bit difficult to understand and apply.

Rock dynamics and applications is an important part of rock mechanics and rock engineering, when rock materials and rock masses are subjected to dynamic loads including earthquake and explosions. The studies of rock dynamics involve the formation and transmission of dynamic loads, responses and failures of rock materials and rock masses under the dynamic loads, as well as dynamic rock failure processes of under static loads. Due to the additional “dimension” of time, dynamics, at least in the discipline of rock mechanics, remains a challenging topic to understand and to apply. Much new researches are needed and are indeed on-going. This book is organized to summarize the state-of-the-art in rock dynamics and applications, highlighting the current scientific research activities and engineering application challenges, covering all the aspects ranging from analytical and numerical works to laboratory testing, and to engineering. The book includes research dealing with rock dynamics theory, rockfall hazards, earth surface dynamics and geomorphometry. Rockfalls and landslides have been given special focus by including case histories which also discuss about risk assessment. I hope it will be insightful for the readers and help them understand the subject in depth.

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