

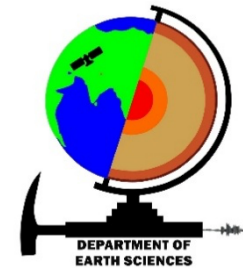


Wednesday Talk Series

Date: Wednesday, December 10, 2025

Time: 04:00 PM-5:00 PM

Venue: Mithal Hall, Department of Earth Sciences, IIT Roorkee



Modelling of P-SV Wave Amplification using the Finite Difference Method (FDM)

Speaker: Ashutosh Singh



Abstract: Simulation near-surface seismic amplification in an elastic medium using the Finite Difference Method (FDM) Amplification of P-SV waves is a critical factor in ground motion severity as energy propagates from the borehole to the surface. Therefore, detailed modeling of the shallow subsurface structure in an elastic medium is performed using the Finite Difference Method (FDM). This study utilizes KiK-net PSV borehole records to constrain a multi-layered, elastic velocity model for synthetically generating particle motion at the surface. Preliminary runs confirmed that conventional FDM fails due to the severe staircasing error at the irregular ground surface, which suppressed amplification. To overcome this numerical limitation, we implement a Boundary-Conforming FDM technique that completely utilizes the detailed subsurface characteristics and topography. The simulated results are validated against observed P-SV records at the surface through a comparison of PGA. The simulated acceleration output is rigorously compared with the observed KiK-net surface data, This work provides a verifiable deterministic framework for seismic site assessment.

Brief introduction: Ashutosh Singh is an MHRD Research Scholar in the Department of Earth Sciences at IIT Roorkee, working under the supervision of Prof. Anand Joshi. He holds a B.Sc. (Hons.) in Geology from University of Delhi and M.Sc. in Geophysics from IIT Kharagpur. Before joining IIT Roorkee, he worked as a Project Associate at the Atomic Minerals Directorate for Exploration and Research, Jaipur. His doctoral research focuses on ground-motion simulation using finite-difference methods to better understand earthquake ground-shaking characteristics.