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Application of Seismic Interferometry for Railway Embankment and Soil Monitoring

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Seismic interferometry (SI) retrieves seismic responses by, for example, cross-correlating observations at different receiver locations, offering a new data for subsurface imaging. Monitoring soil conditions along railway embankments is essential for ensuring the stability and safety of rail infrastructure. This study explores the use of **active and passive seismic sources**, combined with SI technique, to enhance subsurface imaging.

Active seismic sources produce high-resolution reflections and surface-wave data, critical for identifying and monitoring key soil properties. These controlled sources provide superior signal-to-noise ratios and establish a reliable baseline for subsurface imaging. Passive seismic sources, such as train-induced vibrations, complement active-source data by providing continuous and natural excitation of the subsurface. Both active and passive sources are processed using SI technique, with **adaptive subtraction applied to suppress dominant surface waves and improve imaging clarity.**

The integration of active- and passive-source data might help achieve better interpretation of the subsurface and monitoring for possible changes. Although this study is still under development, it demonstrates the potential to deliver a scalable, non-invasive solution for monitoring railway embankments and surrounding soils. By advancing our understanding of subsurface conditions, this approach could contribute substantially to the predictive maintenance and safety of rail infrastructure, paving the way for future innovations in geophysical monitoring.

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