

Rayfract™ software functionality :

Rayfract™ allows the non-intrusive imaging of the subsurface, for geotechnical engineering and exploration. The software works according to the seismic tomography method. The underground is sounded and illuminated with seismic waves. These waves are generated with e.g. a weight drop or a sledge hammer and measured with geophones. Based on these measurements, Rayfract™ then computes an approximated image of the subsurface. Applications are road and tunnel construction, mining, dam construction & monitoring and civil engineering in general.

More detailed description :

Rayfract™ allows the non-intrusive imaging of the subsurface, for geotechnical engineering and exploration. The software works according to the seismic tomography method. Seismic waves i.e. acoustic waves are generated at "shot points" e.g. with a small dynamite charge or a hammer. These waves propagate through and illuminate the subsurface. Receivers are planted at known distances from the shot point, along a straight line. These receivers convert the ground vibrations caused by the seismic waves into electrical signals. A digital seismograph records these signals, one trace for each receiver. Rayfract™ allows the picking of first breaks based on these traces. The first break is the fastest traveltime of seismic waves between source and receiver. The seismic tomography method then allows the imaging of seismic wave velocity distribution in the subsurface, based on these first breaks and the recording geometry. The method iteratively improves a subsurface velocity model and models how seismic waves propagate through the model. The computation ends once the modeled first breaks optimally fit the measured and picked first breaks. Based on the resulting seismic velocity model, the interpreter then can make an educated guess at subsurface features, such as local thickness of the soil or loose sediment layer overlying the hard rock "basement". Seismic velocity is a physical material property. Each material has a typical range of seismic velocities. Soil or loose sediment have a low seismic velocity. Hard rock has a high seismic velocity.