

Seismology from its beginning is based on an analysis of ground vibrations caused by earthquakes - seismic waves. At the early stage of the development this analysis was relatively simple - just detecting waves and calculating their basic characteristics, like location of their sources.

During the time more and more advanced analysis become possible which lead us to understanding the earth structure, mechanisms of earthquakes, possibilities of estimating of seismic hazard, to name a few. Nowadays, with advanced data processing techniques we can obtain much more information about physics of earthquake sources than ever as, for example, we can infer meter-sized movements of

rocks during earthquakes at depths of tens of kilometers. However, such advanced techniques require huge computational resources and can seldom be carried out. There is thus a need for searching for more efficient approaches which could make seismological analysis more efficient. This project is devoted to an attempt of applying one of such techniques developed for acoustic investigation, namely Time Reverse Mirroring. Based on the very basic principles - symmetries it allows to process extremely efficient waveform data and, as first tests suggest, can significantly improve seismological data analysis. Moreover, within this project besides bringing the TRM method closer to seismology we shall attempt to fill some still existing gaps in the theoretical foundation of the method.