



## **Recent advances in the inverse theory - from the least squares data fitting to Markov Chain Monte Carlo sampling**

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Most of the seismological/geophysical analysis about the earth structure and processes within it is carried out as an inference from the data measured at the surface of the Earth or from the space. Traditionally this kind analysis is called the inverse process. Its successful application requires three elements: observational data, understanding of the physical relations between observed and thought quantities, and finally the appropriate mathematical tools to deal with the task in the hand. The last element, namely the inverse theory, has recently got a new boost in its development when the new techniques based on the Markov Chain Monte Carlo has been incorporated to the geophysical inverse theory. This recent development of the inverse theory is caused by an increasing demand for the methods which allows not only a simple estimation of the values of the analyzed parameters but allows also an efficient evaluation of the inversion uncertainties

In this presentation I shortly discuss the basic elements of the modern inverse theory with an emphasizing of the advantages introduced to the “inversion practice” by the Monte Carlo sampling technique. The presentation of the theoretical advancement of the inverse theory is illustrated by an example of the seismic tomography imaging, which technique was introduced to seismology by Aki almost three decades ago and has been proved to be a very successful seismological imaging tool.