
Inverse problems are the theoretical basis for remote sensing and non-destructive evaluation. Examples from geophysics, medicine, and technology will be mentioned. The basic idea is simple: one wants to get information about the properties of a body from the observation of waves scattered by the body.

One-dimensional inverse scattering and spectral problems will be studied. The inverse scattering problem consists of finding the unknown coefficient $q(x)$ in the equation:

$$ Lu - k^2 u := -u'' + q(x)u - k^2 u = 0, \quad x > 0, \quad k > 0 $$

from the knowledge of scattering data, such as phase shifts, bound states and norming constants. Eigenfunction expansion theorems will be proved, scattering data will be defined, and the inverse scattering problem will be studied. Inverse spectral problem consists of finding $q(x)$ from the knowledge of the spectral function of the operator $L$. The notion of the spectral function will be explained.

In the future multidimensional inverse problems will be considered.