

Abstract

Several convergence results in Hilbert scales under different source conditions are proved and orders of convergence and optimal orders of convergence are derived. Also, relations between those source conditions are proved. The concept of a multiple Hilbert scale on a product space is introduced, regularization methods on these scales are defined, both for the case of a single observation and for the case of multiple observations. In the latter case, it is shown how vector-valued regularization functions in these multiple Hilbert scales can be used. In all cases convergence is proved and orders and optimal orders of convergence are shown. Finally, some potential applications and open problems are discussed.

Keywords: Inverse problem, Ill-posed, Hilbert scale, regularization.

AMS Subject classifications: 47A52, 65J20