

A Convergence Theory of Approximate Weak Solutions of Linear Operator Equations

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Abstract

A new approach to analyzing convergence of some classes of approximate methods of solutions to linear operator equations is proposed. The novelty consists of applying a new type of linear topological spaces offering a friendly environment concerning analysis free of obstacles whose typical representatives are those met when Hilbert and Banach space approach is used. As the main tools the following concepts and techniques should be mentioned. 1. Application and of some special linear topological spaces such as linear metric spaces, nuclear spaces etc. 2. Theory of linear operators in linear topological spaces. We should mention that the above concepts have been invented in a well known series of monographs of I.M. Gelfand and his coworkers. 3. Most of the results obtained for linear problems can be applied to analyzing and solving nonlinear problems. 4. Some numerical experiments are in preparation.

References

1. I.M. GELFAND AND G. YE. SHILOV. Generalized Functions Vol. 1: Generalized Functions and their Calculus. State Edition of Mathematics and Physics Literature, Moscow 1958. (In Russian).
2. I.M. GELFAND AND G. YE. SHILOV. Generalized Functions Vol. 2: Spaces of Basic and Generalized Functions. State Edition of Mathematics and Physics Literature, Moscow 1958. (In Russian).
3. I.M. GELFAND AND G. YE. SHILOV. Generalized Functions Vol. 3: Some Questions in Theory of Partial Differential Equations. State Edition of Mathematics and Physics Literature, Moscow 1961. (In Russian).
4. I.M. GELFAND AND N. YA. VILENKIN. Generalized Functions Vol. 4: Some Applications of Harmonic Analysis and Rigid Hilbert Spaces. State Edition of Mathematics and Physics Literature, Moscow 1961. (In Russian).
5. I.M. GELFAND AND M.I. GRAEV AND N.YA. VILENKIN. Generalized Functions Vol. 5: Integral Geometry and Connected Questions in Representation Theory. State Edition of Mathematics and Physics Literature, Moscow 1962. (In Russian).
6. I.M. GELFAND AND M.I. GRAEV AND I.I. PYATETSKII-SHAPIRO. Generalized Functions Vol. 6: Integral Geometry and Connected Questions in Representation Theory. State Edition of Mathematics and Physics Literature, Moscow 1966. (In Russian).