Iterative methods for fixed point problems

30 h lectures

In these lectures we present iterative methods for finding fixed points of a wide class of operators in Hilbert spaces in a consolidated way. We introduce some classes of operators, give their properties, define iterative methods generated by operators from these classes, and present general convergence theorems. On this basis we present the conditions under which particular methods converge.

1. Fixed point problems
2. Quasi-nonexpansive operators and their properties
3. Iterative methods
4. Convergence theorems
5. Applications

Literature:

1. Heinz H. Bauschke and Patrick L. Combettes, Convex Analysis and Monotone Operator Theory in Hilbert Spaces, Springer, New York, 2011.
2. Andrzej Cegielski, Iterative Methods for Fixed Point Problems in Hilbert Spaces, Lecture Notes in Mathematics 2057, Springer, Heidelberg, 2012.
3. Yair Censor and Stavros. A. Zenios, Parallel Optimization, Theory, Algorithms and Applications, Oxford University Press, New York, 1997.
4. Frank Deutsch, Best Approximation in Inner Product Spaces, Springer-Verlag, New York, 2001.
5. Francisco Facchinei and Jong-Shi Pang, Finite-Dimensional Variational Inequalities and Complementarity Problems, Volume I, II, Springer, New York, 2003
6. K. Goebel and W. A. Kirk, Topics in Metric Fixed Point Theory, Cambridge University Press, Cambridge 1990. Polish translation: Zagadnienia metrycznej teorii punktów stałych, Wydawnictwo UMCS, Lublin, 1999.