

FULL REGULARIZATION BY MEANS OF THE LINEAR FUNCTIONAL STRATEGY ¹

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In the Regularization theory the unknown solution of an ill-posed problem is approximated by a sequence of elements produced by a regularization method. These elements are usually parametrized by the values of the so-called regularization parameters, and a huge body of the theory has been built around the issue of selecting just one approximate solution out of such a sequence. In this talk we are going to discuss a new regularization scheme, where all elements of a regularization sequence are used as a basis for approximation of the unknown solution.

In the Hilbert space setting the coefficients of the best approximant can be viewed as the values of linear functionals of the unknown solution. The theoretical results that were obtained earlier, tell us that these values can in principle be estimated more accurately than the whole unknown solution. This observation opens a new opportunity for constructing a better approximant in the form of a linear combination with estimated coefficients.

The estimated coefficients are the results of special algorithms which are known under a common name of the linear functional strategy. The main idea consists in a combination of the linear functional strategy with various regularization methods.

We illustrate this idea by applications arising from machine learning. One of such applications is concerned with the management of the therapy of the Diabetes Mellitus.

The presentation is based on the joint research with Galyna Kriukova and Pavlo Tkachenko, both from RICAM.

REFERENCES

- [1] G. Kriukova, O. Panasiuk, S.V. Pereverzyev and P. Tkachenko. A linear functional strategy for regularized ranking. *Neural Networks*, **73:1**, 26–35, 2016.

¹The research has been supported by the Austrian Science Fund (FWF), grants P25424 and I1669.