

## APPROXIMATE APPROXIMATIONS AND SOME OF ITS APPLICATIONS

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The course is devoted to the approximation procedures called approximate approximations, introduced by V. Maz'ya in the late of 80's. Most of these procedures have one common feature: they are very accurate without being convergent in a rigorous sense. The lack of convergence is compensated by the flexibility in the choice of basis functions and by the simplicity of the multi-dimensional generalizations. The most important applications of approximate approximations is the approximation of integral operators. Many integral operators of mathematical physics are convolutions with singular kernel functions, for example with fundamental solutions of partial differential operators. Because of the singularity of the integrand the numerical computation of those integrals by standard methods is an involved and time-consuming task. Here the use of approximate quasi- interpolants with adapted basis functions can be very advantageous.

Besides several topics of [1], we present recent results obtained together with V. Maz'ya (University of Liverpool, UK; Department of Mathematics, Linköping University, Sweden) and G. Schmidt (Weierstress Institute for Applied Analysis and Stochastics, Berlin, Germany) concerning the fast computation of high dimensional volume potential which uses the basis functions introduced in the theory of approximate approximations.

**References**

- [1] V. Maz'ya and G. Schmidt, *Approximate Approximations*, Math. Surveys and Monographs, 141, AMS 2007.