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DIFFERENTIATION OF INTEGRALS

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The dissertation is devoted to the study of differentiation of integrals.

The first part contains an extension of duality result from [1]. The weak Vitali property of general differentiation basis is investigated in connection with the ability to derivate some function spaces. We show that when Young function Ψ satisfies some weak regularity and growth condition the validity of Lebesgue Differentiation Theorem for Orlicz space L_Φ is equivalent to the classical weak Vitali covering property with respect to the norm of dual space L_Ψ. This cover in particular the classical case $\Phi(t)=t \ln^+ t$. The growth condition of Ψ cannot be relaxed (a counterexample is constructed).

The second part is concerned in the problem of differentiation in an infinitely dimensional space. It is known, besides special counterexamples, that Lebesgue Differentiation Theorem holds in an infinitely dimensional Hilbert space for some class of Gaussian measures but only with convergence in measure. Using fine analysis of Gaussian measure together with deep Stein-Strömberg's result [2] we can assert that Differentiation Theorem with convergence a.e. holds for Gaussian measures with sufficiently quickly decreasing covariance.

Duality between differentiation and overlap gives weak Vitali Covering Theorem also in the infinitely dimensional Hilbert spaces.

References:

[1] GUZMÁN M. de: Real variable methods in Fourier analysis, North Holland Mathematics Studies 46(1981).

[2] STEIN E.M., STRÖMBERG J.O.: Behavior of maximal functions in R_n for large n, Arkiv för Mat. 21(1983), 259-269.

ITERATIVE METHODS FOR THE NUMERICAL SOLUTION OF THE BOUNDARY VALUE PROBLEM OF ELASTICITY

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The thesis deals with the iterative solution of systems of linear algebraic equations arising from the discretization of the boundary value problem of elasticity.

The first part of this work is devoted to preconditions conjugate gradient method with preconditioning given by approximate factorization of the separate displacement component part of the stiffness matrix.

Multilevel method with correction by aggregation of unknowns are considered in the second part of this work. We study the convergence rate and suggest use of overcorrection to accelerate the convergence of the method.

DISCRETE TIME LOSS SYSTEMS AND STOCHASTIC APPROXIMATION WITH DELAYED OBSERVATIONS

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The discrete time loss system D/GI/K/O, where the symbols have the usual meaning, is investigated, especially its efficiency e (the complement of