ORIGINAl PAPERS

Page 843–861  Michela Egidi
On null-controllability of the heat equation on infinite strips and control cost estimate

We consider an infinite strip $\Omega_L = (0, 2\pi L)^{d-1} \times \mathbb{R}$, $d \geq 2$, $L > 0$, and study the control problem of the heat equation on $\Omega_L$ with Dirichlet or Neumann boundary conditions, and control set $\omega \subset \Omega_L$. We provide a sufficient and necessary condition for null-controllability in any positive time $T > 0$, which is a geometric condition on the control set $\omega$. This is referred to as “thickness with respect to $\Omega_L$” and implies that the set $\omega$ cannot be concentrated in a particular region of $\Omega_L$. We compare the thickness condition with a previously known necessity condition for null-controllability and give a control cost estimate which only shows dependence on the geometric parameters of $\omega$ and the time $T$.

Page 862–876  Jishan Fan, Yuxi Hu, and Gen Nakamura
Local well-posedness for an isentropic compressible Ginzburg–Landau–Navier–Stokes with vacuum

In this work, we prove the local well-posedness of local strong solutions to an isentropic compressible Ginzburg–Landau–Navier–Stokes system with vacuum in a bounded domain $\Omega \subset \mathbb{R}^3$.

Page 877–899  L. C. F. Ferreira, M. F. Furtado, E. S. Medeiros, and J. P. P. da Silva
On a weighted trace embedding and applications to critical boundary problems

We prove a weighted Sobolev trace embedding in the upper half-space and give its best constant. This embedding can be employed to study a number of critical boundary problems. In this direction, we obtain existence and nonexistence results for a class of semilinear elliptic equations with nonlinear boundary conditions involving critical growth. These equations are closely related to the study of self-similar solutions for nonlinear reaction-diffusion equations.

Page 900–955  Ziyi He, Dachun Yang, and Wen Yuan
Real-variable characterizations of local Hardy spaces on spaces of homogeneous type

Let $(X, d, \mu)$ be a space of homogeneous type, with upper dimension $\mu$, in the sense of R. R. Coifman and G. Weiss. Let $\eta$ be the Hölder regularity index of wavelets constructed by P. Auscher and T. Hytönen. In this article, the authors introduce the local Hardy space $h^{s, p}(X)$ via local grand maximal functions and also characterize $h^{s, p}(X)$ via local radial maximal functions, local non-tangential maximal functions, local atoms and local Littlewood–Paley functions. Furthermore, the authors establish the relationship between the global and the local Hardy spaces. Finally, the authors also obtain the finite atomic characterizations of $h^{s, p}(X)$. As an application, the authors give the dual spaces of $h^{s, p}(X)$ when $p \in (\omega/(\omega + \eta), 1)$, which further completes the result of G. Dafni and H. Yue on the dual space of $h^{s, 1}(X)$. This article also answers the question of R. R. Coifman and G. Weiss on the nonnecessity of any additional geometric assumptions except the doubling condition for the radial maximal function characterization of $H^{1}_{cw}(X)$ when $\mu(X) < \infty$. 

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Mieczysław Mastyło and Enrique A. Sánchez Pérez

Ideals of multilinear mappings via Orlicz spaces and translation invariant operators

We study some new summability properties of multilinear operators. We introduce the concepts of $\varphi$-summing, $\varphi$ semi-integral and $\varphi$-dominated multilinear maps generated by Orlicz functions. We prove a variant of Pietsch’s domination theorem for $\varphi$-summing operators, providing also a characterization of $\varphi$-dominated operators in terms of factorizations. We analyze vector-valued inequalities associated to these maps, which are applied to obtain general variants of multiple summing operators. We also study translation invariant multilinear operators acting in products of spaces of continuous functions, proving that a factorization theorem can be obtained for them as a consequence of a suitable representation of the corresponding normalized Haar measure.

Shengyong Pan

Stable equivalences of Morita type for $\Phi$-Beilinson–Green algebras

The main focus of this paper is to present a method to construct new stable equivalences of Morita type. Suppose that a $B$-$A$-bimodule $N$ define a stable equivalence of Morita type between finite dimensional algebras $A$ and $B$. Then, for any generator $X$ of the $A$-module category and any finite admissible set $\Phi$ of natural numbers, the $\Phi$-Beilinson–Green algebras $G^\Phi_A(X)$ and $G^\Phi_B(N \otimes_A X)$ are stably equivalent of Morita type. In particular, if $\Phi = \{0\}$, we get a known result in literature. As another consequence, we construct an infinite family of derived equivalent algebras of the same dimension and of the same dominant dimension such that they are pairwise not stably equivalent of Morita type. Finally, we develop some techniques for proving that, if there is a graded stable equivalence of Morita type between graded algebras, then we can get a stable equivalence of Morita type between Beilinson–Green algebras associated with graded algebras.

Hemanth Saratchandran

Essential self-adjointness of perturbed quadharmonic operators on Riemannian manifolds with an application to the separation problem

We consider perturbed quadharmonic operators, $\Delta^4 + V$, acting on sections of a Hermitian vector bundle over a complete Riemannian manifold, with the potential $V$ satisfying a bound from below by a non-positive function depending on the distance from a point. Under a bounded geometry assumption on the Hermitian vector bundle and the underlying Riemannian manifold, we give a sufficient condition for the essential self-adjointness of such operators. We then apply this to prove the separation property in $L^2$ when the perturbed operator acts on functions.