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On Lie modules of Banach space nest algebras

Pedro Capitão[1] **and Lina Oliveira**[1,2]

[1] *University of Lisbon*
Instituto Superior Técnico, Portugal
[2] *Centre for Mathematical Analysis, Geometry, and Dynamical Systems*

E-mail address: *pedro.capitao@tecnico.ulisboa.pt; linaoliv@math.tecnico.ulisboa.pt*

Abstract

Modules of Hilbert space nest algebras have been extensively investigated. In particular, given a weakly closed Lie module $\mathcal{L}$ of a nest algebra, the largest weakly closed bimodule $\mathcal{J}$ contained in $\mathcal{L}$ has been characterized.

In this work, we show that a similar result holds for weakly closed Lie modules of Banach space nest algebras. More precisely, we explicitly construct the bimodule $\mathcal{J}$. The role of the rank one operators is paramount in this construction.

Keywords: Bimodule, Lie module, nest algebra.

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Kernels and ranges of finite rank asymmetric truncated Toeplitz operators

A Riemann-Hilbert approach

Carlos Carteiro[1,2]

[1] *University of Lisbon*
[2] *Calouste Gulbenkian Foundation*

E-mail address: *carlos.carteiro@tecnico.ulisboa.pt*

Abstract

Finite rank asymmetric truncated Toeplitz operators are studied in the context of the Hardy space $H^2(\mathbb{C}^+)$. Their equivalence after extension to 2×2 matricial Toeplitz operators will be used to characterize the respective kernels. Also, a complete description of ranges will be provided in the case of infinite dimensional domain.

Based on joint work with M. C. Câmara and J. R. Partington.

Keywords: Toeplitz operators, asymmetric truncated Toeplitz operators, model spaces, Riemann-Hilbert problem.

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Bimodules of Banach Space Nest Algebras

Luís Duarte[1,2] **and Lina Oliveira**[1,2]

[1] *University of Lisbon*
Instituto Superior Técnico, Portugal
[2] *Centre for Mathematical Analysis, Geometry, and Dynamical Systems*

E-mail address: *luisinhopld73@gmail.com; linaoliv@math.tecnico.ulisboa.pt*

Abstract

We generalize results concerning nests, nest algebras and bimodules over a nest algebra to the setting of Banach spaces. We investigate bimodules by studying the relation between the bimodules and the support functions and the essential support functions on the nest. A particular focus is given to determining the maximal and the minimal bimodule with a given support function, essential support function or support function pair.

Keywords: nest, nest algebra, bimodule, support function, essential support function.

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What is the optimal geometry for vibrating membranes?

Tereza Kurimaiová[1,2]

[1] *Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague*
[2] *Department of Theoretical Physics, Nuclear Physics Institute, Academy of Sciences*

E-mail address: *kurimter@fjfi.cvut.cz*

Abstract

We introduce the self-adjoint Robin Laplacian with negative boundary parameter and some of the properties of its spectrum. Of our main interest will be the isoperimetric spectral inequality for the first eigenvalue which is the only known example where the ball is not an optimiser. This was proved using the asymptotic expansion of the first eigenvalue of the ball and annulus. Afterwards, we will present

an attempt to prove that the annulus is the optimiser using the so called parallel coordinates. Finally, an upper bound for particular not simply connected domains will be obtained.

Keywords: Robin Laplacian, Bareket conjecture, negative parameter.

Finite rank operator decomposability in Lie modules

Gabriel Matos[1] **and Lina Oliveira**[1,2]

[1] *University of Lisbon*
Instituto Superior Técnico, Portugal
[2] *Centre for Mathematical Analysis, Geometry, and Dynamical Systems*

E-mail address: *gabriel.matos@tecnico.ulisboa.pt; linaoliv@math.tecnico.ulisboa.pt*

Abstract

A finite rank operator is said to be decomposable in a space of operators if it can be written as a finite sum of rank-1 operators lying in that space. The question of decomposability has been studied in a wide variety of different settings. Although interesting in and of itself, decomposability can have important consequences. Recently, decomposability in Lie ideals over nest algebras has received some attention. Here, we discuss decomposability in Lie modules over continuous nest algebras. In doing so, we stress the role of some associated subspace lattices.

Keywords: finite rank operator, Lie module, subspace lattice.

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On Bishop-type operators

Miguel Monsalve López

Universidad Complutense de Madrid
Instituto de Ciencias Matemáticas (ICMAT), Spain

E-mail address: *migmonsa@ucm.es*

Abstract

Bishop-type operators are one of the simplest examples of operators acting on L^p spaces. We shall show that under some hypothesis Bishop-type operators are power-regular, a concept introduced by Atzmon in 1995.

As a consequence, we will derive some interesting spectral properties for this kind of operators.

This is a joint work with Eva A. Gallardo Gutiérrez.

Keywords: Bishop-type operators, spectral theory, functional analysis.

C-normal operators

Anna Wicher[1,2] **and Katarzyna Simik**[1,2]

[1]*Pedagogical University of Cracow*
[2]*Institute of Mathematics*

E-mail address: *ania123wch@gmail.com; kasia.simik@interia.pl*

Abstract

Let $\mathcal{H}$ be a complex Hilbert space and let C be a conjugation, i.e. antylinear, isometric involution. An operator A is called C-symmetric if $CAC = A^*$. Theory of C-symmetric operators have been developed recently. We propose the definition of C-normal operators, give examles and basic properties.

Keywords: involution, C-symmetry.

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