

Concurrent Session 1

Seminar 5

Representations of Low Dimensional Lie Algebras and Applications

Dr. Ryad Ghanam, Virginia Commonwealth University in Qatar

In this talk I will report on the progress of the problem of finding linear representations for low-dimensional real Lie algebras. For each Lie algebra of dimension less than or equal to 6, I will give a matrix Lie group whose Lie algebra is the given algebra in the list. As an application, I will show how to use these representations to solve the inverse problem of Lagrangian mechanics for the canonical connection on Lie groups.

Seminar 6

QU-Placer Math Test: Improved Placement and Pedagogical Diagnostic Decisions

Dr. Walid Massoud, Qatar University Testing Center

The Foundation Program Department of Math (FPDM) made consistent observations over time that the previously used math placement test was not adequately assigning students with pre-requisite skills to their courses. Since December 2016, FPDM and the Qatar University Testing Center (QUTC) have been working closely to develop a standardized math test (QU-Placer) aligned with the content of both Foundation-level courses. The QU-Placer has been constructed with recent and the most widely used standards for test development. 3,325 students participated in field tests associated with the QU mathematics placement test between early Spring 2018 and early Spring 2019 to develop an item bank. QU's decision to use the QU-Placer test was taken in March 2019. The new test has much better validity for QU use and improved fairness for QU students. Relevant test-related analyses are improving the quality of instruction students receive.

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Seminar 7

On parametric Marcinkiewicz Integral Operators

Dr. Ahmad Salman, Sultan Qaboss University

In 1958, E. M. Stein introduced Marcinkiewicz integrals in higher dimensions. Since then, the theory of Marcinkiewicz integrals has attracted the attention of many mathematicians. This is due to their importance in various branches of mathematics. In this presentation, we are interested in discussing the L^p boundedness of a class of parametric Marcinkiewicz integral operators. Let \mathbb{R}^n , $n \geq 2$ be the n -dimensional Euclidean space and S^{n-1} be the unit sphere in \mathbb{R}^n equipped with the induced Lebesgue measure $d\sigma$. Let Ω be a homogeneous function of degree zero on \mathbb{R}^n that is integrable over S^{n-1} and satisfies

$$\int_{S^{n-1}} \Omega(y') d\sigma(y') = 0 \quad (0.1)$$

where $y' = |y|^{-1}y$ for $y \neq 0$. Consider the following class of parametric Marcinkiewicz integral operators

$$\mu_{\Omega,h}^{\rho} f(x) = \left(\int_{-\infty}^{\infty} \left| 2^{-\rho t} \int_{|y| \leq 2^t} f(x-y) |y|^{-n+\rho} h(|y|) \Omega(y) dy \right|^2 dt \right)^{\frac{1}{2}},$$

where h is a radial function on \mathbb{R}^n satisfying $h(|x|) \in l^{\infty}(L^q)(\mathbb{R}^+)$, $1 \leq q \leq \infty$, where the class $l^{\infty}(L^q)(\mathbb{R}^+)$ is defined by

$$l^{\infty}(L^q)(\mathbb{R}^+) = \{h : \|h\|_{l^{\infty}(L^q)(\mathbb{R}^+)} = \sup_{j \in \mathbb{Z}} \left(\int_{2^{j-1}}^{2^j} |h(r)|^q \frac{dr}{r} \right)^{\frac{1}{q}} < \infty\}.$$

We shall highlight some old and recent results concerning the class of operators $\mu_{\Omega,h}^{\rho}$. A considerable attention will be given to the investigation of the L^p boundedness of a $\mu_{\Omega,h}^{\rho}$ under the sole integrability condition $\Omega \in L^1(S^{n-1})$.

Seminar 8

An Overview of Mathematical Committees in Oman

Dr. Magda Al-Hinai, President of Omani Mathematical Community

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