Announcement I

XVIII International Workshop on Wavelets, Differential Equations and Analysis

University of Havana, February 23-27, 2015

Organized by:

- Faculty of Mathematics and Computation,
  University of Havana, Cuba.

- Department of Mathematics and Statistics, Concordia
  University, Montréal, Canada.

Honorary President:

-Dr. Raul Guinovart, Decano de la Facultad de Matematica y Computacion, Universidad de la Havana.

Organizing Commitee:

-Dr. S. Twareque Ali, Department of Mathematics and Statistics,
Concordia University, Montreal (Co-President)
—Dr. Reinaldo Rodríguez Ramos, Facultad de Matemática y Computación, Universidad de La Habana (Co-President)
-Dr. Alejandro Mesejo Chiong, Facultad de Matemática y Computación, Universidad de la Habana.
-Dr. Mariano Rodríguez, Facultad de Matemática y Computación, Universidad de La Habana.
-Dr. Julian Bravo-Castillero, Facultad de Matemática y Computación, Universidad de La Habana.
-M.Sc. Juan Carlos Lopez Realpozo, Facultad de Matemática y Computación, Universidad de La Habana.
-M.Sc. Leonardo Cortes, Facultad de Matemática y Computación, Universidad de La Habana.
-Dr. Raúl Guinovart, Facultad de Matemática y Computación, Universidad de La Habana.
-Dr. Jose Antonio Otero Hernandez, Instituto de Cibernetica, Matematica y Fisica (ICIMAF)
-Dr. Kurt Bernardo Wolf, Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México, Cuernavaca.

This will be the **eighteenth** in a series of annual workshops centered on the general themes of wavelets, differential equations, mechanics and related topics. As in the last workshop, again this year the theme has been broadened to include **some topics in functional analysis and geometry and number theory**. Two short courses on these latter topics will be given by (1) Prof. Isabelle Chalendar, Université Lyon and Prof. W. Arendt, Universität Ulm (on continuous operators on Hilbert spaces of functions) and (2) by Prof. Sylvie Paycha, Universität Potsdam (on renormalization methods in geometry and number theory). The course outlines will sent in the next announcement.

The workshop itself will consist of both expository talks and shorter contributed talks.

The **objective of these meetings** has been to facilitate exchange of ideas between Cuban researchers and students with their colleagues in other countries. Past meetings have always generated a cordial and relaxed atmosphere for work and recreation (Cuba is renowned for its touristic opportunities, including eco-tourism, its colorful cultural and literary heritage and its deep historical interest). A number of exchanges between research groups in Cuba and outside have developed as a result of these meetings, and it is hoped that this sort of mutual exchange will continue to develop.

Lectures will also be invited from prominent and internationally recognized researchers from Cuba and other countries. Besides invited talks, participants are encouraged to give contributed talks, bearing on or related to the general theme of the meeting. A certain number of talks, on topics of current interest in mathematics and mathematical physics, not necessarily directly related to the theme of the conference, will also be accommodated.

If you are interested in presenting such a talk, please send in a title and an abstract by e-mail before Feb 4, 2014. In any case, if you would like to participate in the Workshop, an early, even tentative, indication of your intent would help the organizers in planning the meeting.

In a subsequent mailing we shall post the names of invited speakers. If you wish to stay in a private room in Havana, this could be arranged. Prices are around (US)$25 - 30 per night. In this case please write to Dr. Reinaldo Rodríguez Ramos at the e-mail address below.

Registration fee:

There will be a registration fee of 100 CUC (Convertible Cuban pesos) for all non-Cuban participants and 100 pesos (in the Cuban national currency) for Cuban participants

Proceedings:

It is expected that the proceedings of the Workshop will be published possibly in a special issue of the Revista de Ciencias Matematicas, published by the University of Havana). Contributions will be refereed before being accepted for publication. Further information will be provided during the Workshop.

Scientific Correspondence:

Please direct all scientific correspondence (abstracts of lectures, etc.) to one of the following addresses:

Dr. Reinaldo Rodríguez Ramos
Facultad de Matemática y Computación
Universidad de la Habana, CP 10400
San Lazaro y L
Ciudad de La Habana, Cuba
Phone: (+53-7) 78 86 90, (+53-7) 78 60 89
Fax: (+53-7) 33 57 74. E-mail: reinaldo@matcom.uh.cu

Dr. S. Twareque Ali
Department of Mathematics and Statistics
Concordia University
1455 de Maisonneuve Blvd, West
Montréal, Québec
Canada H3G 1M8
Phone: (+1-514) 848 2424 Ext. 3237
Fax: (+1-514) 848 2831. E-mail: twareque.ali@concordia.ca

I. Chalendar

Continuous operators on Hilbert spaces of analytic functions

The aim of this mini-course is to give a flavour of classical Hilbert spaces of analytic functions as well as large classes of linear and continous mapping acting on them, mixing the so-called "function theory", "operator theory" and finally "semi-group theory".

Lecture 1

We define the Hardy space H^2 on $\mathbb{D}$, the open unit disk of the complex plane, as well as its weighted version including the Dirichlet space and the Bergman space. We present some of their main properties used in the sequel and give their so-called "reproducing kernels".

Lecture 2

We study classical examples of linear and continuous mappings on the Hardy space H^2 such as Toeplitz operators and composition operators by an analytic symbol from $\mathbb{D}$ to itself. For this purpose we will present in particular the Hardy-Littlewood subordination principle.

Lecture 3

We show how to provide the continuity of lower-triangular operators (e.g. some weighted composition operators, Toeplitz operators) on spaces of analytic functions containing the Hardy space. One of the Phragmèn-Lindelöf principles, that we will discuss in detail, will be a useful tool in this context.

Lecture 4

After having presented the Denjoy-Wolff theory for the iterates of an analytic self-map of $\mathbb{D}$, we will present the main results of Berkson, Porta and Siskakis on strongly continuous semi-groups of analytic functions.

Lecture 5

Thanks to the tools presented in the three first lectures, we will revisit the results of Lecture 4, and we will extend them to other semigroups. The lectures on the general theory of strongly continuous semigroups will be extensively used.

References

- I. Chalendar and J. Partington, Norm estimates for Weighted Composition Operators on spaces of Holomorphic functions, Complex analysis and operator theory, 2014 (8), 1087-1095.

- R. A. Martnez-Avendao and P. Rosenthal, An Introduction to Operators on the Hardy-Hilbert Space, Springer, 2010.

- W. Rudin, Real and Complex Analysis, 3rd ed., McGraw-Hill, 1987.

W. Arendt

An introduction to strongly continuous semigroups of operators

Given a bounded operator A on a Banach space X,

$$T(t) := e^{tA}$$

defines a norm continuous semigroup. In this course we extend the concept of exponentials to certain unbounded operators leading to the theory of strongly continuous semigroups.

Lecture 1

We briefly present the notion of unbounded and closed operators on a Banach space. Then we define and give examples of strongly continuous semigroups of bounded operators.

Lecture 2

We define the generator and the resolvent of a semigroup and state the main links between them. The relation between the semigroups and the Cauchy problem is also discussed in detail.

Lecture 3

We prove the Hille-Yosida theorem, which characterizes strongly continuous semigroups of contractions in terms of their resolvent. We also present other characterizations involving the numerical range of the generator.

Lecture 4

The aim of the last lecture is to give applications to the resolution of partial differential equations. In particular, we will discuss well-posedness of parabolic equations with boundary conditions.

References

- K.-J. Engel, R. Nagel: A Short Course on Operator Semigroups. Springer. Berlin 2009.
- W. Arendt, C. Batty, M. Hieber, F. Neubrander: Vector-valued Laplace Transforms and Cauchy Problems. Birkhäuser, 2011.
- W. Arendt: 9th Internet Seminar 2005/06: Heat Kernels.