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Blaschke Products and Their Applications

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Conference on *Blaschke Products and Their Applications*
Fields Institute
Toronto
July 25 to 29, 2011

Preface

Infinite Blaschke products were introduced by Blaschke in 1915. However, finite Blaschke products, as a subclass of rational functions, has existed long before without being specifically addressed as finite Blaschke products. In 1929, R. Nevanlinna introduced the class of bounded analytic functions with almost everywhere unimodular boundary values. Then the term inner function was coined much later by A. Beurling in his seminal study of the invariant subspaces of the shift operator. The first extensive study of the properties of inner functions was made by W. Blaschke, W. Seidel and O. Frostman. The Riesz technique in extracting the zeros of a function in a Hardy space is considered as the first step of the full canonical factorization of such elements. The disposition of zeros of an inner function is intimately connected with the existence of radial limits of the inner function and its derivatives.

For almost a century, Blaschke products have been studied and exploited by mathematicians. Their boundary behaviour, the asymptotic growth of various integral means of Blaschke products and their derivatives, their applications in several branches of mathematics in particular as solutions to extremal problems, their membership in different function spaces and their dynamics are examples from a long list of active research domains in which they show their face.

With the exclusive help of Fields Institute, we held a conference on Blaschke Products and their Application from July 25 to 29, 2011, at the University of Toronto. The purpose of the conference was to bring together a wide spectrum of mathematicians in this area. With more than 50 specialists and young researchers from around the globe, we had 36 talks. There were 28 one-hour talks and 8 thirty-minute talks. Besides discussing Blaschke products, or more generally inner functions, and their properties, their applications in other domains were also extensively discussed. In particular, the following topics were of primary attention:

i. Approximation theory (L. Baratchart, A. Boivin, P. Gorkin, V. Prokhorov),
ii. Boundary values (W. Ross),
iii. Conformal metrics (O. Roth),
iv. Critical points (S. Favorov, D. Kraus),
v. Differential equations (J. Benbourenane, J. Heittokangas),
vi. Dynamical systems (O. Ivrii),

vii. Geometry (U. Daepp),
viii. Harmonic analysis (M. Pap),
ix. Hyperbolic geometry (L. Baribeau),
x. Integral means (D. Vukotic),
xi. Inner functions (A. Nicolau),
xii. Interpolation (P. Gorkin, G. Semmler),
xiii. Morse theory (L. Baratchart),
xiv. Operator theory (H. Bommier, S. Charpentier, D. Drissi),
xv. Pluripotential theory (A. Edigarian, W. Zwonek),
xvi. Riemann-Hilbert problem (C. Glader),
xvii. Ritt's theory (P. Tuen-Wai Ng),
xviii. Spectral theory of Toeplitz operators (E. Shargorodsky),
xix. Theory of analytic functions (I. Chyzhykov, R. Fournier, Q. Rahman),
xx. Theory of computation (T. McNicholl),
xxi. Truncated Toeplitz operators (J. Cima, W. Ross).

These talks were highly appreciated by the participants. It also confirms the fact that Blaschke products impressively appear in a large number of various fields and this conference allowed us to bring together a wide spectrum of prominent mathematicians of different domains.

This proceedings is the outcome of the conference. It contains 15 research-survey papers which are presented in alphabetical order of their titles. We would like to thank all the participants, the authors for their valuable contributions, and the Fields Institute for its unique and generous support of this event.

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