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Pseudo-Differential Operators: Complex Analysis and Partial Differential Equations

**International Workshop, York University, Canada,
August 4–8, 2008**

B.-W. Schulze
M.W. Wong
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Preface

The *International Workshop on Pseudo-Differential Operators: Complex Analysis and Partial Differential Equations* was held at York University on August 4–8, 2008. The first phase of the workshop on August 4–5 consisted of a mini-course on pseudo-differential operators and boundary value problems given by Professor Bert-Wolfgang Schulze of Universität Potsdam for graduate students and post-docs. This was followed on August 6–8 by a conference emphasizing boundary value problems; explicit formulas in complex analysis and partial differential equations; pseudo-differential operators and calculi; analysis on the Heisenberg group and sub-Riemannian geometry; and Fourier analysis with applications in time-frequency analysis and imaging.

The role of complex analysis in the development of pseudo-differential operators can best be seen in the context of the well-known Cauchy kernel and the related Poisson kernel in, respectively, the Cauchy integral formula and the Poisson integral formula in the complex plane \mathbb{C} . These formulas are instrumental in solving boundary value problems for the Cauchy-Riemann operator $\bar{\partial}$ and the Laplacian Δ on specific domains with the unit disk and its biholomorphic companion, i.e., the upper half-plane, as paradigm models. The corresponding problems in several complex variables can be formulated in the context of the unit disk in \mathbb{C}^n , which may be the unit polydisk or the unit ball in \mathbb{C}^n . Analogues of the Cauchy kernel and the Poisson kernel and their ramifications to express solutions of boundary value problems in several complex variables can be looked upon as singular integral operators, which are de facto equivalent manifestations of pseudo-differential operators. It is the vision that bringing together experts in explicit formulas for boundary value problems in complex analysis working with *kernels* and specialists in pseudo-differential operators working with *symbols* should build synergy between the two groups. The functional analysis and real-life applications of pseudo-differential operators are always among top priorities in our agenda and these are well represented in the workshop and in this volume.