FOREWORD

Alan McIntosh spent his undergraduate years at the University of New England in Armidale NSW where he obtained his BSc(Hons) in 1962. He gained his PhD at the University of California, Berkeley in 1966 under František Wolf. After a year at the Institute for Advanced Study, Princeton, he returned to Australia and began a long association with Macquarie University. In 1999, after 32 years at Macquarie, he became Head of the Centre for Mathematics and its Applications at ANU.

Throughout his time at Macquarie, McIntosh provided leadership in analysis. For many years his group ran weekly seminars which typically attracted participants from the other universities in Sydney. Many well-known mathematicians presented lectures. McIntosh made strong post-doctoral appointments with a diversity of backgrounds and fostered excellence in research. One of his major goals was and remains to nurture young mathematicians. The result has been a long list of outstanding mathematical advances from McIntosh and those who have been fortunate to come under his influence.

McIntosh's early work on accretive bilinear forms was heavily influenced by Tosio Kato (Berkeley), and it was a problem posed by his mentor in 1960 that led to McIntosh's most significant work. The Kato square root problem asks whether the square root of an accretive operator in divergence form is stable under perturbations of the original operator. It was not until 1981 that the one dimensional version of this problem was solved in the fundamental work of Ronald Coifman (Yale), McIntosh and Yves Meyer (ENS-Cachan). In this paper [11], the authors also solved the conjecture of Calderón on the boundedness of the Cauchy integral on a Lipschitz curve. It took until 2000 for the two dimensional version of the problem to fall at the hands of Steve Hofmann (Missouri) and McIntosh. In the following year, the full arbitrary dimensional solution was given in the joint work of Pascal Auscher (Paris-Sud), Hofmann, Michael Lacey (Georgia Tech.), McIntosh and Philippe Tchamitchian (Marseille). Beginning with his collaboration with Coifman and Meyer, McIntosh was to forge remarkable links between the harmonic analysis of the Zygmund school and the operator theory of Kato and others. This work involves the use of square function estimates associated with particular operators, and the construction of the corresponding functional calculi, and depends

upon L^p estimates for singular integrals. One specific aim is to study boundary value problems for linear partial differential equations with non-smooth coefficients on irregular domains, and associated nonlinear problems. Results are obtained under natural geometric conditions and these are of special interest when applied to nonlinear problems arising from physical or geometric phenomena. They also have implications for parabolic and hyperbolic problems. The principal methods involve developing the harmonic analysis of operators directly on domains or on their boundaries.

Topics related to McIntosh's research include boundedness of singular integrals and Fourier multipliers on Lipschitz surfaces; heat kernel bounds and functional calculi of elliptic partial differential operators; compensated compactness; spectral theory and functional calculi of operators; and Clifford analysis.

McIntosh has been a Fellow of the Australian Academy of Science since 1986. Very recently he was awarded the Moyal Medal for 2002 for his contributions to mathematics, in particular for his fundamental contributions to harmonic analysis and partial differential equations.