Preface

The chapters in these two volumes have at least one (co)author who spoke at the February Fourier Talks during the period 2006–2011.

The February Fourier Talks

The February Fourier Talks (*FFT*) were initiated in 2002 as a small meeting on harmonic analysis and applications, held at the University of Maryland, College Park. Since 2006, the *FFT* has been organized by the Norbert Wiener Center in the Department of Mathematics, and it has become a major annual conference. The *FFT* brings together applied and pure harmonic analysts along with scientists and engineers from industry and government for an intense and enriching two-day meeting. The goals of the *FFT* are the following:

- To offer a forum for applied and pure harmonic analysts to present their latest cutting-edge research to scientists working not only in the academic community but also in industry and government agencies,
- To give harmonic analysts the opportunity to hear from government and industry scientists about the latest problems in need of mathematical formulation and solution,
- To provide government and industry scientists with exposure to the latest research in harmonic analysis,
- To introduce young mathematicians and scientists to applied and pure harmonic analysis,
- To build bridges between pure harmonic analysis and applications thereof.

These goals stem from our belief that many of the problems arising in engineering today are directly related to the process of making pure mathematics applicable. The Norbert Wiener Center sees the *FFT* as the ideal venue to enhance this process in a constructive and creative way. Furthermore, we believe that our vision is shared

by the scientific community, as shown by the steady growth of the *FFT* over the years.

The *FFT* is formatted as a two-day single-track meeting consisting of thirty-minute talks as well as the following:

- Norbert Wiener Distinguished Lecturer series
- General interest keynote address
- Norbert Wiener Colloquium
- Graduate and postdoctoral poster session

The talks are given by experts in applied and pure harmonic analysis, including academic researchers and invited scientists from industry and government agencies.

The Norbert Wiener Distinguished Lecture caps the technical talks of the first day. It is given by a senior harmonic analyst, whose vision and depth through the years have had profound impact on our field. In contrast to the highly technical day sessions, the keynote address is aimed at a general public audience and highlights the role of mathematics, in general, and harmonic analysis, in particular. Furthermore, this address can be seen as an opportunity for practitioners in a specific area to present mathematical problems that they encounter in their work. The concluding lecture of each *FFT*, our Norbert Wiener Colloquium, features a mathematical talk by a renowned applied or pure harmonic analyst. The objective of the Norbert Wiener Colloquium is to give an overview of a particular problem or a new challenge in the field. We include here a list of speakers for these three lectures:

Distinguished lecturer	Keynote address	Colloquium
• Peter Lax	• Frederick Williams	• Christopher Heil
• Richard Kadison	• Steven Schiff	• Margaret Cheney
• Elias Stein	• Peter Carr	• Victor Wickerhauser
• Ronald Coifman	• Barry Cipra	• Robert Fefferman
• Gilbert Strang	• William Noel	• Charles Fefferman
	• James Coddington	• Peter Jones
	• Mario Livio	

The Norbert Wiener Center

The Norbert Wiener Center for Harmonic Analysis and Applications provides a national focus for the broad area of mathematical engineering. Applied harmonic analysis and its theoretical underpinnings form the technological basis for this area. It can be confidently asserted that mathematical engineering will be to today's mathematics departments what mathematical physics was to those of a century ago. At that time, mathematical physics provided the impetus for tremendous advances within mathematics departments, with particular impact in fields such as differential

equations, operator theory, and numerical analysis. Tools developed in these fields were essential in the advances of applied physics, e.g., the development of the solid-state devices which now enable our information economy.

Mathematical engineering impels the study of fundamental harmonic analysis issues in the theories and applications of topics such as signal and image processing, machine learning, data mining, waveform design, and dimension reduction into mathematics departments. The results will advance the technologies of this millennium.

The golden age of mathematical engineering is upon us. The Norbert Wiener Center reflects the importance of integrating new mathematical technologies and algorithms in the context of current industrial and academic needs and problems. The Norbert Wiener Center has three goals:

- Research activities in harmonic analysis and applications
- Education—undergraduate to postdoctoral
- Interaction within the international harmonic analysis community

We believe that educating the next generation of harmonic analysts, with a strong understanding of the foundations of the field and a grasp of the problems arising in applications, is important for a high-level and productive industrial, government, and academic workforce.

The Norbert Wiener Center web site: www.norbertwiener.umd.edu

The Structure of the Volumes

To some extent the eight parts of these two volumes are artificial placeholders for all the diverse chapters. It is an organizational convenience that reflects major areas in harmonic analysis and its applications, and it is also a means to highlight significant modern thrusts in harmonic analysis. Each of the following parts includes an introduction that describes the chapters therein:

Volume 1

I Sampling Theory
II Remote Sensing
III Mathematics of Data Processing
IV Applications of Data Processing

Volume 2

V Measure Theory
VI Filtering
VII Operator Theory
VIII Biomathematics

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