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of Reviewers

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FLUIDIZATION XII

New Horizons in Fluidization Engineering

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II

The Fluidization XII logo was created by **Yails Hernandez**, MGDC, a graphic designer from Saskatoon, Canada who specializes in digital art. The logo was inspired by the artistic style of the First Nations people of Canada's west coast. The shades of red and black are traditional colors of West Coast Nations while the sweeping lines that start with broad strokes and end with narrow lines are also trademarks of West Coast art. Within the arcs defined by these lines is a rendition of a bubbling fluidized bed reactor. The outer circle reflects the global nature of the topics of this conference as well as the international participation that has been its tradition.

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III

The co-Chairs wish to dedicate this book to Professors Norman Epstein, Maurice Bergounou and John Grace who have been their very effective and inspiring mentors, and have greatly influenced the field of fluidization in Canada and throughout the world.

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PREFACE

Fluidization is an important field of both fundamental research and broad industrial applications. Current understanding of the complex fluid-particle two- and three-phase flow patterns, coupled with heat and mass transfer and chemical reactions, is still insufficient for practitioners to reliably design and scale up commercial fluidized bed reactors. The past eleven Engineering Foundation Fluidization Conferences, from 1975 to 2004, have put the emphasis on fundamental research to stimulate exchange of ideas from researchers all over the world in order to develop generic tools and theories for fluidization and its applications.

The present Fluidization XII conference continues the distinguished tradition of this conference series, with its focus on fundamental research of fluidization, but it significantly expands into emerging applications of fluidization and novel fluidization technologies. The four invited plenary papers cover four challenging and industrially important areas of fluidization: design and scale-up, instrumentation and diagnosis, multiscale modeling and simulation, and applications in clean and renewable energy. Circulating fluidized beds (CFBs) and bubbling fluidized beds remain the focal areas of fundamental research. As in other recent fluidization conferences, CFBs (both risers and downers) continue to receive greater attention than bubbling fluidization, with 23 contributions on CFBs and 10 contributions on bubbling in this conference. Noticeably, there are four papers dealing with high-density and high-flux risers, while feed configuration, reactor modeling and reactor performance are the subject of downers. Papers on bubbling fluidization deals with bubble flow pattern distribution, manipulation and gas flow field, and particle movement near the wall. Twenty papers deal with modeling and simulation of fluidized beds using computational fluid dynamics (CFD), with subjects ranging from simulation of flow structures, heat transfer and inversion in liquid-solids binary particle systems to reactor performances, capturing the recent interests and advances in this area. Jetting and spouting received a revised interest in this conference, with 15 papers dealing with hydrodynamics, mixing, scale-up and applications for coal gasification, chemical vapour deposition of silicon, powder granulation, and hydrogen production. Flow structure and layer inversion of binary particle mixtures, bed contraction, gas hydrate formation are the subjects of eight papers on gas-liquid-solids systems.

Fluidization of ultrafine and nano particles is the subject of 10 contributions, dealing with assisted fluidization, coating, grinding and production of nano particles. More than 20 papers explored the application of fluidized beds for biomass combustion, gasification, pyrolysis and hydrogen production, chemical looping combustion, cracking of used edible oil, air and water pollutant abatements, demonstrating the commitment and contribution of the fluidization community to the global efforts on greenhouse gas emission reduction and environmental protection.

Measurement and monitoring of multiphase systems remain a challenge to fluidization researchers. Recent advances in this area is well represented by the 10 papers in this conference, exploring the application of positron emission particle tracking, multi-particle tracking, magnetic resonance, confocal microparticle tracking, x-ray fluoroscopy, electrostatic and capacitance tomography for fluidized beds, and the development of advanced signal analysis techniques. Heat transfer in bubbling, turbulent and fast fluidized beds are contributed by 5 papers in this conference.

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The number of participants in this prestigious conference series has been around 150, balanced from all over the world and from both academia and industry and the proceedings have long risen to the role of an internationally reputed key reference. They lend themselves to be a directory of qualified people and a treasure of current trends and perspective goals in fluidization research. Fluidization XII has attracted a record number of quality contributions and we are proud to present them in this book of Proceedings as well as in the ECI Symposium Series (<http://services.bepress.com/eci/>)

We wish to gratefully acknowledge the authors, the sponsors, the reviewers and all the people that have generously contributed time and efforts to make this Fluidization XII conference another great success.

Xiaotao Bi, Franco Berruti and Todd Pugsley

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