PREFACE

While the Compact Heat Exchanger (CHE) technology has been advancing considerably over the last couple of decades, the cost, space and efficiency improvement pressures and significant interest in development of new technologies such as nanotechnology, fuel cell technology, etc. have spurred a significant interest in further development of more compact and enhanced heat exchangers thus reducing mass and volume of the exchanger in such applications. CHEs are characterized by high heat transfer areas per unit volume (above 400 m^2/m^3; hydraulic diameter $D_h \leq 6$ mm) and per unit mass, usually achieved by construction techniques that result in a large number of small channels, now advancing to mini and microchannels with significant improvement in heat transfer surface area density (meso heat exchangers ≥ 3000 m^2/m^3 and $D_h \leq 1$ mm; micro heat exchangers $\geq$ 15,000 m^2/m^3 and $D_h \leq 100$ μm). The resistance to introducing these technologies in industry is driven by concerns about fouling and cleanability, ruggedness, safety (especially in high temperature, high pressure applications), and designability. However, continuing advances at both the fundamental and equipment-development levels and a growing database of successful plant experiences have demonstrated that significant capital and operating cost savings can be achieved by the reasoned application of CHEs, ultra-CHEs and enhanced heat exchangers.

The first International Conference on Compact Heat Exchangers for the Process Industries was held during June 22-27, 1997 in Snowbird, Utah, USA. The Second International Conference on Compact Heat Exchangers and Enhancement Technology for the Process Industries was held in Banff, Canada during July 18-23, 1999. The Third International Conference on Compact Heat Exchangers and Enhancement Technology for the Process Industries was held in Davos, Switzerland during July 2-6, 2001. They were sponsored by The United Engineering Foundation, New York, USA. The Fourth International Conference on Compact Heat Exchangers and Enhancement Technology for the Process Industries was held in Crete Island, Greece, during September 29 – October 3, 2003, sponsored by Engineering Conferences International, Brooklyn, New York, USA. Each of these conferences was attended by about 80-90 specialists with about 50% participants from industries. The conference program included Keynote lectures, tutorial lectures/short course, panel discussions, and contributed technical papers. These conferences were highly successful and unique, bringing together an effective mix of technical specialists from industry, universities and government organizations for technical discussions on a very focused subject area.

This proceedings includes most of the papers presented at this Conference. A total of 65 papers from 16 countries are included in the book. The book is divided into the following sections.

Single-Phase Flow and Heat Transfer Fundamental Studies – I and II
Single-Phase Heat Transfer Design Data and Methods – I, II, III and IV
Single-Phase Micro & Meso CHEs and CFD
Poster Session
Plate Heat Exchangers
Single-Phase Heat Exchanger Development and Applications – I
Phase-Change Heat Exchanger Fundamental Studies – I, II, III and IV
Phase-Change Heat Exchanger Development and Applications
Fouling in Heat Exchangers

These papers represent a focused attention to the use of CHEs Science, Engineering and Technology and indicate enormous opportunities.

We appreciate the efforts and assistance provided by the following regional committee members who took the responsibility of encouraging appropriate experts from industry and academia to present papers and getting submitted papers reviewed.

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