הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

הפקולטה להנדסה כימית
ע"ש וולפסון
The Wolfson Department of Chemical Engineering

Wolfson Department of Chemical Engineering Seminar

Seminar Zoom ID: https://technion.zoom.us/j/97265679988

Monday - April 21st, 2025 at 13:30 (Israel time)

Title: "Generalized Population Balance Equation for Multiphase Flow System and Its Application in Chemical, Energy, and Bioprocess"

Prof. Bo Kong

In this presentation, I will explore the theoretical foundation of the Generalized Population Balance Equation (GBPE) and its applications in the chemical, energy, and bioprocess industries. GBPE is a mathematical model used to describe the particle size distribution and dynamic behavior of particles in multiphase flow systems, playing a critical role in understanding and predicting particle dynamics. This model integrates micro-scale processes such as nucleation, growth, aggregation, breakage, and attrition, providing an accurate mathematical framework for characterizing the spatiotemporal variations in particle size distribution within multiphase flow systems. By leveraging this model, it is possible to effectively analyze and design multiphase flow systems, enhancing the ability to control and optimize particle behavior. Through the introduction of our experimental and numerical simulation studies across diverse fields - including nanomaterial synthesis, industrial crystallization, polymerization, metal spray, radioactive aerosol, and microbial growth etc. - we will demonstrate the critical role of GBPE in analyzing and optimizing multiphase flow systems. These case studies not only deepen our understanding of multiphase flow systems but also offer a robust mathematical foundation and computational tools for improving and innovating industrial processes. Ultimately, this presentation aims to showcase the powerful capabilities of GBPE and promote its application across a wider range of industrial fields to achieve more efficient processes and innovative products.