PREFACE

The field of chemical engineering is advancing on many fronts at the same time, and is in greater danger of fragmentation than ever before. The hot new fields of biotechnology, information technology, novel materials, and environmetal protection all have their own specialized journals and meetings. This fragmentation is happening in all fields in America, and not only in chemical engineering. In the 1930s, everyone read *Life* magazine, which appealed to a wide audience and gave millions of people a set of information that was generally considered important to share. Any two people getting together could talk about what they had read in this magazine. Its preeminence and readership has eroded over the years, to magazines devoted exclusively to sports, fashion, entertainment, health, etc. This year, we hear that this venerable magazine will cease publication. Now, there are fewer things in common that any two people can share.

Fortunately, *Advances in Chemical Engineering* is still being published in the hope of bringing out something that all chemical engineers should know, in addition to the specialized journals that they read. This time we have two topics that have made giant strides both in theory and in applications. The simple single phase flow reactors have received most of the attention in the past, in academia due to their simplicity which is amenable to analysis, and in industry due to their predictability in that they will perform as designed. However, industry has increasingly turned to gas–liquid bubble columns, solid–liquid fluidized beds, gas–solid fluidized beds, and three phase beds for their heavy lifting. There is a great need for an update on what we know now, and how that knowledge can be used to help in design. The chapter on ''Hydrodynamic Stability of Multiphase Reactors'' by J. B. Joshi *et al.* of the University of Bombay analyzes the investigations of the past fifty years, critiques them on their contributions, and provides unified criteria on stability and transition. It will be heavily used to make further advances, both in understanding and in practice.

Model predictive control (MPC) is a very widely used process control technology for process plants. They have been in use for many years before there was a sound understanding of how they work, and what their limitations are. There is now a firm foundation on MPC theory, which promises to push the envelope in plant design and implementation. We should not

automatically assume that better knowledge will lead to better practice. The surgeon–researcher Judah Folkman once remarked that medical science has known the cause of sickle cell anemia for fifty years, but there is still no cure; and we do not know the cause of appendicitis, but it is very easy to cure. It takes outstanding engineering creativity to go from knowledge to better practice. The chapter on ''Model Predictive Controllers: A Critical Synthesis of Theory and Industrial Needs'' by Michael Nikolaou of the University of Houston presents an overview of some of the most important recent developments in MPC theory, and their implications.

JAMES WEI