Control Of A Fluidized Bed Polyethylene Reactor

Over the last decade, circulating fluidization or fast fluidization has developed rapidly, superseding standard bubbling fluidization in many applications; for example, fast fluidization provides a better means forcontrolling emissions from the combustion of high-sulfur fuels and excels when used in boilers in steam plant and power stations. China initiated the study of fast fluidization in the early 1970s. Focusing on the substantial research cultivated in that country, with Kwauk at the leading edge, this latest volume in the Advances in Chemical Engineering Series is written in the context of the international state of the art and addresses some of the most vital issues surrounding this fluidization method."

Combined Feedforward-feedback Control of a Fluidized-bed ReactorModelling and Control of a Fluidized Bed GasifierFluidized Bed Technologies for Near-Zero Emission Combustion and GasificationElsevier

Although there were many books and papers that deal with gasification, there has been only a few practical book explaining the technology in actual application and the market situation in reality. Gasification is a key technology in converting coal, biomass, and wastes to useful high-value products. Until renewable energy can provide affordable energy hopefully by the year 2030, gasification can bridge the transition period by providing the clean liquid fuels, gas, and chemicals from the low grade feedstock. Gasification still needs many upgrades and technology breakthroughs. It remains in the niche market, not fully competitive in the major market of electricity generation, chemicals, and liquid fuels that are supplied from relatively cheap fossil fuels. The book provides the practical information for researchers and graduate students who want to review the current situation, to upgrade, and to bring in a new idea to the conventional gasification technologies.

Fluidized bed (FB) combustion and gasification are advanced techniques for fuel flexible, high efficiency and low emission conversion. Fuels are combusted or gasified as a fluidized bed suspended by jets with sorbents that remove harmful emissions such as SOx. CO2 capture can also be incorporated. Fluidized bed technologies for near-zero emission combustion and gasification provides an overview of established FB technologies while also detailing recent developments in the field. Part one, an introductory section, reviews fluidization science and FB technologies and includes chapters on particle characterization and behaviour, properties of stationary and circulating fluidized beds, heat and mass transfer and attrition in FB combustion and gasification systems. Part two expands on this introduction to explore the fundamentals of FB combustion and gasification including the conversion of solid, liquid and gaseous fuels, pollutant emission and reactor design and scale up. Part three highlights recent advances in a variety of FB combustion and gasification technologies before part four moves on to focus on emerging CO2 capture technologies. Finally, part five explores other applications of FB technology including (FB) petroleum refining and chemical production. Fluidized bed technologies for near-zero emission combustion and gasification is a technical resource for power plant operators, industrial engineers working with fluidized bed combustion and gasification systems and researchers, scientists and academics in the field. Examines the fundamentals of fluidized bed (FB) technologies, including the conversion of solid, liquid and gaseous fuels Explores recent advances in a variety of technologies such as pressurized FB combustion, and the measurement, monitoring and control of FB combustion and gasification Discusses emerging technologies and examines applications of FB in other processes

A column which contains a series of three fluidized beds for counter-current contacting of solid particles with a gas stream has been studied. Successful, independent control of solids holdup on each stage has been achieved by manipulating the field of a magnetic distributor-downcomer on each stage. Two methods to manipulate the field were investigated: an "on/off" method versus a continuous adjustment of the DC current used to create the field (the "leaking valve"). A model of the column, which includes pressure fluctuations in each fluidized bed, was used to design a control law based on proportional feedback control with some logic statements to compensate for interactions. Both simulated and actual performances in setpoint and disturbance rejection experiments were obtained with solids consisting of 100 percent iron, 50/50, and 25/75 percent mixtures of iron and sand. In all cases the gas stream was air. The leaking valve approach was found to be more efficient in terms of average power consumption and in some experiments was found to yield better performances. This is the first study of the magnetic distributor-downcomer under conditions where there is a net flow of solids through the fluidized bed. This is also the first study of a process where multiple fluidized bed stages are used and interactions are analyzed. The study of the staged fluidized beds when not all the solids are magnetic yielded new results on particle segregation within a bed as well as modifications needed in the control law.

"A phenomenological model of the dynamic behaviour based on the steady-state model was formulated and validated with experimental data. The model predicted accurately the responses of temperature and product concentrations." --

The fluidized-bed reactor is the centerpiece of industrial fluidization processes. This book focuses on the design and operation of fluidized beds in many different industrial processes, emphasizing the rationale for choosing fluidized beds for each particular process. The book starts with a brief history of fluidization from its inception in the 1940’s. The authors present both the fluid dynamics of gas-solid fluidized beds and the extensive experimental studies of operating systems and they set them in the context of operating processes that use fluid-bed reactors. Chemical engineering students and postdocs as well as practicing engineers will find great interest in this book.