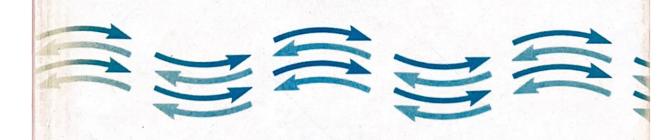
# Circulating Fluidized Bed Technology II



Edited by Prabir Basu and Jean François Large

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### **Preface**

The First International Conference on Circulating Fluidized Bed was held in Halifax, Canada in November, 1985. This conference excited much interest amongst participants from industry, universities and government laboratories. So, a group of prominent researchers from industry and universities decided to continue the conference at a frequency of approximately two and a half years. A permanent secretariat was established at Halifax to help organize the conference in different countries with the help of a local body.

The Second International conference on Circulating Fluidized Bed, chaired by Prof. J. F. Large, was held at the University of Compiegne, France. Approximately 250 delegates from 23 different countries attended this conference. About 110 abstracts were submitted. Out of these 55 papers were selected for publication in the Proceedings through a process of Peer Review. All papers were revised and modified as required by the reviewer. Three specialized workshops were held for free discussions on the following topics: a) Flow structure of fast beds; b) Design of high temperature CFB and c) Applications of CFB in petroleum chemical Industries. These workshops took stock of the present state of development and tried to find common grounds in controversial areas.

The understanding of some aspects of fast fluidized bed has improved since the Halifax Conference. The radial non-uniformity of voidage, at least for smaller crosssection reactors is now generally accepted. There is some speculation about the distribution of voidage in large industrial units underscoring the need of data on large diameter units. Some investigators feel the assumption of cluster is not necessary to explain the high gas-solid slip velocity. Although it can be explained by the downfow of solids in the reactor annulus, video pictures demonstrate the existence of long solid agglomerates. There is a general agreement on the existance of a denser bed at the bottom and a relatively dilute region at the top of the reactor. The relative position of these phases for a system depends upon the superficial velocity, solid circulation and the imposed pressure drop.

The dependence of convective heat transfer on the average bed density rather than superficial velocity is supported by further experiments. An important observation is that heat transfer measured by small probes is much larger than that measured by long water cooled panels of industrial boilers. Radiation is recognised as playing a major part in the high temperature Circulating Fluidized Bed, but further data would be necessary to quantify its nature and contribution. Though some experimental data on combustion efficiency and sulphur capture is presented, fundamental understanding of the combustion mechanism and sulphur capture is still lacking. Data on burning rate, attrition and fragmentation in Circulating Fluidized Beds are lacking.

The commercial application of Circulating Fluidized Bed boilers is progressing rapidly, perhaps faster than the research. The largest units in operation and under construction are 110 MWe and 125 MWe respectively. Units as large as 250 MWe are being considered by utility companies. A number of design alternatives are being studied. Extended operations of commissioned units generated confidence on this process and also dispelled many myths.

The need to further improve the Circulating Fluidized Bed boiler design to make it more reliable and competitive is evident. Additional research is required in all aspects of the fast bed reactor and ancillary equipment (cyclones, return legs ...) specifically for larger utility units. Other major conclusions from the conference are: the need for studies on solid mixing and new column geometry as these relate to scale up from existing plant size and the operating characteristics of CFB are such that they could be advantageously used in other applications.

We wish to thank the tireless effort of Catherine Lacroix, Maureen Caron, Rama Basu and Rita Gyarmati. We also thank all who spent their valuable time in reviewing papers for this volume. Their effort greatly helped enhance the quality of the papers published in this proceedings.

We hope this volume will provide a great service to scientists, engineers, students and decision makers and inspire the readers to prepare for the Third International Conference on Circulating Fluidzed Beds to be held in Beijing in 1990.

P. Basu

May, 1988

J. F. Large

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