NOVEL TECHNIQUES FOR SLURRY BUBBLE COLUMN HYDRODYNAMICS

Final Technical Report

Principal Investigators:

M.P. Dudukovic
The Laura and William Jens Professor and Chairman
Director, Chemical Reaction Engineering Laboratory

Washington University
Department of Chemical Engineering
Campus Box 1198
One Brookings Drive
St. Louis, Missouri 63130
Fax: 314-935-4832
Phone: 314-935-6021
E-mail: dudu@wuche3.wustl.edu

L.-S. Fan
Distinguished University Professor
Chairman, Department of Chemical Engineering

Ohio State University
Department of Chemical Engineering
140 West 19th Avenue-Room 125
Columbus, Ohio 43210-1180
Fax: 614-292-3769
Phone: 614-292-7907
E-mail: FAN@er6s1.eng.ohio-state.edu

Min Chang
Senior Staff Engineer

Exxon Research and Engineering
P.O. Box 101
Florham Park, NJ 07931
Fax: 201-765-1189
Phone: 201-765-6109
E-mail: mchang@crsgil.erenj.com

Co-Investigators

Washington University:	Dr. M. Al-Dahhan, Dr. J. Chen, P. Gupta, Dr. A. Kemoun, Dr. R. Mudde (Delft University), Dr. Y. Pan, S. Roy, Dr. Y. Yang
Ohio State University:	Dr. P. Jiang, D.J. Lee, G. Shaver
Exxon Research and Engineering:	Dr. C. Coulaloglou, Dr. W. Heard

DRAFT
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Novel Techniques for Slurry Bubble Column Hydrodynamics

Final Technical Report
DE FG 22 95 PC 95212
July 1, 1995 – June 30, 1998
+ 9 month no cost extension

ABSTRACT

The objective of this cooperative research effort between Washington University, Ohio State University and Exxon Research Engineering Company was to improve the knowledge base for scale-up and operation of slurry bubble column reactors for syngas conversion and other coal conversion processes by increased reliance on experimentally verified hydrodynamic models.

During the first year (July 1, 1995 – June 30, 1996) of this three year program novel experimental tools (computer aided radioactive particle tracking (CARPT), particle image velocimetry (PIV), heat probe, optical fiber probe and gamma ray tomography) were developed and tuned for measurement of pertinent hydrodynamic quantities, such as velocity field, holdup distribution, heat transfer and bubble size. The accomplishments were delineated in the First Technical Annual Report.

The second year (July, 1996 – June 30, 1997) was spent on further development and tuning of the novel experimental tools (e.g., development of Monte Carlo calibration for CARPT, optical probe development), building up the hydrodynamic data base using these tools and comparison of the two techniques (PIV and CARPT) for determination of liquid velocities. A phenomenological model for gas and liquid backmixing was also developed. All accomplishments were summarized in the Second Annual Technical Report.

During the third and final year of the program (July 1, 1997 – June 30, 1998) and during the nine months no cost extension, the high pressure facility was completed and a set of data was taken at high pressure conditions. Both PIV, CT and CARPT were used. More fundamental hydrodynamic modeling was also undertaken and model predictions were compared to data. The accomplishments for this period are summarized in this report.

NOVEL TECHNIQUES FOR SLURRY BUBBLE COLUMN HYDRODYNAMICS
DE FG 22-95 PC 95212

Joint University/Industry Project
June 1, 1995 - July 30, 1998
(+ 9 Months No-Cost Extension)
FINAL TECHNICAL REPORT

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