
FLUID/PARTICLE SEPARATION JOURNAL

COVERING

**Research and development, graduate student contributions,
elementary and advanced tutorials, solutions to practical
problems and test procedures.**

a Publication of
THE AMERICAN FILTRATION & SEPARATIONS SOCIETY



devoted to

Satisfying the multifaceted needs and interests of theoreticians and technical practitioners, equipment manufacturers and users, and federal and local government agencies, involved and interested in all aspects of fluid / particle separation

Volume 8, Number 1, February, 1995

TABLE OF CONTENTS

PUBLISHER'S DATA	1F
EDITORIAL	2F
ATTENTION CONTRIBUTORS, STRATEGIC CONCERNS & REPRINT INFORMATION	3F
AFS CONFERENCES & MEETINGS & CALENDAR	4F
PUBLICATIONS & BOOKS	5F

APPLICATION / TESTING PAPERS

RHA A SURPRISINGLY EFFECTIVE FILTER AID

Roy S. Rieber	1
---------------------	---

MEASURING TURBIDITY - TRANSLATING THEORY TO PRACTICAL APPLICATION

Terry L. Engelhardt.....	5
--------------------------	---

IMPROVED WASTE WATER AND SLUDGE FILTRATION WITH FULLY AUTOMATED PRESSURE FILTERS

Robert W. Mau

Gary S. Miller

Stephen V. Tracy.	7
------------------------	---

ACTUAL CHALLENGE TESTING VS. MICRON RATING & COULTER POROMETER VALUES

Dr. Ernest Mayer	11
------------------------	----

"NONHAZARDOUS OILFIELD WASTE TO A PRODUCT: THE REUSE OF NOW"

Wm. Thomas Ballantine	20
-----------------------------	----

Continued

THEORETICAL / TECHNICAL PAPERS
PEER REVIEWED & ABSTRACTED BY CHEMICAL ABSTRACT

EVALUATION OF A FINITE DIFFERENCE METHOD FOR FILTRATION

- Ali J. Chamkha 22
Moawya A. Allaham
John Peddieson, Jr. 22

**IMPROVEMENT OF BIOLOGICAL WASTEWATER
SYSTEMS USING DISSOLVED AIR FLOTATION**

- Daniel B. Guss 29

MODELING OF DISPERSED PARTICULATE SYSTEMS

PART 1: THE BASICS OF PROCESS MODELING

- George G. Chase 33

MODELING OF DISPERSED PARTICULATE SYSTEMS

PART 2: CONSTITUTIVE MODELS FOR COMPRESSIVE BEDS

- George G. Chase 38

USING GENETIC ALGORITHMS FOR

ADJUSTING EMPIRICAL CONSTANTS IN COMPUTER

MODELS OF MINERAL PROCESSING EQUIPMENT

- Charles L. Karr
Dorian Yeager 47

COMPREHENSIVE MODEL OF BATCH SEDIMENTATION

- Prasad Chodavarapu
Sastry S. Munukutla
John Peddieson, Jr. 54

OUT OF THE PAST:

TO PURIFY WATER - WATER FILTER HOME BREWED ALE 1863

- Frank M. Tiller 58

FLUID / PARTICLE SEPARATION JOURNAL

PUBLISHER'S DATA

PURPOSE OF THE JOURNAL

Fluid-particle separation is a part of many fields including mining, environmental, pulp and paper, paints and coatings, food and beverages, coal, chemicals, automotive, drilling and production of petroleum, ceramics, biotechnology, air conditioning, clean rooms, electroplating, metal working, laundries, swimming pools and pharmaceutical manufacture. Particles are encountered in ionic, macromolecular, micron, and millimeter sizes. They occur in many forms including suspensions, colloids, emulsions, foams, dusts, flocs, micro-organisms, drops, pigments, aerosols, and pollen. Fluid-particle separation operations include cake filters, deep beds, clarifiers, thickeners, centrifuges, hydrocyclones, gas cyclones, media filtration, membranes, reverse osmosis, electrodialysis, coalescers, scrubbers, electrostatic precipitators, expression, flotation, and heavy media separation. The Fluid/Particle Separation Journal provides an outlet for practical and theoretical contributions to fluid-particle separation and allied areas. It seeks to unite theoreticians and practitioners from many different fields by emphasizing the common principles which apply to fluid-particle separations wherever they may be encountered.

The Journal intends to satisfy the multifaceted needs of theoreticians and practitioners, salesmen and managers, manufacturers and users of equipments, and federal and local government agencies. It faces the challenge of charting a path leading to recognition of fluid-particle separation and processing and allied areas as a recognized branch of engineering and science.

Publication and Staff

The F/PSJ is published three times yearly (*February, June, October*). The annual subscription is \$75.00. Single copies are \$18.75 plus postage. The postage for the U.S. is \$2.90. Overseas surface postage charges are \$10.00. Overseas Airmail postage is \$18.00.

©American Filtration & Separations Society, 1994

All rights reserved; no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the American Filtration & Separations Society. *The Fluid / Particle Separation Journal* is published by the American Filtration & Separations Society,

Printing Company

AAAAA Printing & Mailing Services, Inc.

3749 Erie, Houston, TX 77017

Phone: (713) 644-3700 • Fax: (713) 644-8725

Editor: Leonard J. Ortino, P.E.

(May - Oct.)

9443 Hidden Lake Court, Dexter, MI 48130

Phone: (313) 426-2076 • Fax: (313) 426-2076

(Nov. - April)

3057 Point Clear Dr., Tega Cay, SC 29715

Phone: (803) 548-1445 • Fax: (803) 548-1445

Associate Editor: Guy E. Weismantel

P.O. Box 6269, Kingwood, TX 77325

Phone: (713) 441-4033 • Fax: (713) 441-8228

Associate Editor: Dr. Nellie Abboud, University of Connecticut

85 Pheasant Ridge Drive, Watertown, CT 06795

Phone: (203) 575-8257 • Fax: (203) 596-4104

Technical Editor: Dr. Bernie Scheiner, U. S. Bureau of Mines

University of Alabama

P. O. Box L, Tuscaloosa, AL 35486

Phone: (205) 759-9434 • Fax: (205) 759-9474

Associate Technical Editor: Dr. Ali Chamkha, Kuwait University

Dept. of Mechanical Engineering

P.O. Box 5969, Safat, 13060 - KUWAIT

Phone: (965) 484-9413 • Fax: (965) 484-7131

Associate Editor for Reprints: Richard V. Jensen, Fleetguard, Inc.

1200 Fleetguard Road, Cookville, TN 38501

Phone: (615) 528-9551 • Fax: (615) 528-9583

Editor Emeritus & Journal Contributor: Dr. Frank M. Tiller

7901 Montglen, Houston, TX 77061-1319

Phone: (713) 645-7689 • Fax: (713) 645-7689

Operations Consultant: Dr. Martha Tiller

7901 Montglen, Houston, TX 77061-1319

Phone: (713) 645-7689 • Fax: (713) 645-7689

Editorial Review Board

Dr. Gustavo V. Barbosa-Canovas, Washington St. Univ.

Department of Agricultural Engineering,

Pullman, WA 99164

Phone: (509) 335-6188 • Fax: (509) 335-2722

Dr. George Chase, University of Akron

Chemical Engineering Dept, Akron, OH 44325

Phone: (216) 872-7250 • (216) 972-6990

Dr. Yisun Cheng, Geneva Research Center

Chemical Waste Management

1950 S. Batavia Ave, Geneva, IL 60134

Phone: (708) 513-4877 • (708) 513-6401

Dr. Shiao-Hung Chiang, University of Pittsburgh

Chem. & Petro Engineering Department

1249 Benedum Hall, Pittsburgh, PA 1526

Dr. Kyung-Ju Choi, Fleetguard, Inc.

Rt. 8, Cookville, TN 38501

Phone: (615) 528-9409 • Fax (615) 528-9583

Peter R. Johnston, P.E.,

302 Morningside Drive, Carrboro, NC 27510

Phone: (919) 942-9092

Dr. Kenneth L. Rubow, University of Minnesota

272 Mechanical Engr., Minneapolis, MN 55455

Phone: (612) 625-8354 • (612) 625-6069

Dr. Sandeep Sharma, University of Alabama

U. S. Bureau of Mines

P. O. Box L, Tuscaloosa, AL 35486

Phone: (205) 759-9455 • (205) 759-9474

Dr. Frank Tiller, University of Houston

Chemical Engineering S222 D

4800 Calhoun, Houston, TX 77204

Phone: (713) 743-4322 • Fax: (713) 743-4323