CONTEMPORARY MATHEMATICS

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# Domain Decomposition Methods 10

The Tenth International Conference
on Domain Decomposition Methods
August 10–14, 1997
Boulder, CO

Jan Mandel
Charbel Farhat
Xiao-Chuan Cai
Editors

American Mathematical Society

http://dx.doi.org/10.1090/conm/218

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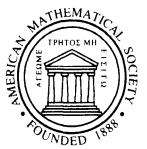


**American Mathematical Society**
Providence, Rhode Island

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Support was provided by the National Science Foundation, ANSYS, Inc., the Sandia National Laboratories, the Colorado School of Mines, the University of Colorado at Boulder, and the University of Colorado at Denver.

1991 *Mathematics Subject Classification.* Primary 65–06;
Secondary 65N55, 65M55, 65Y05, 73–06, 76–06.

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**Library of Congress Cataloging-in-Publication Data**

International Conference on Domain Decomposition Methods for Partial Differential Equations (1997 : Boulder, Colo.)

Domain decomposition methods 10 : the Tenth International Conference on Domain Decomposition Methods, August 10–14, 1997, Boulder, Colorado, USA / Jan Mandel, Charbel Farhat, Xiao-Chuan Cai, editors.

p. cm. — (Contemporary mathematics, ISSN 0271-4132 ; 218)

Includes bibliographical references.

ISBN 0-8218-0988-1 (pbk. : alk. paper)

1. Decomposition method—Congresses. 2. Differential equations, Partial—Congresses. I. Mandel, Jan. II. Farhat, Charbel. III. Cai, Xiao-Chuan, 1962– . IV. Title. V. Series: Contemporary mathematics (American Mathematical Society) ; v. 218.

QA402.2.I57 1997

515′.353—dc21 98-15580

CIP

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10 9 8 7 6 5 4 3 2 1 03 02 01 00 99 98

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# Preface

The annual International Conference on Domain Decomposition Methods for Partial Differential Equations has been a major event in Applied Mathematics and Engineering for the last ten years. The proceedings of the Conferences have become a standard reference in the field, publishing seminal papers as well as the latest theoretical results and reports on practical applications.

The Tenth Conference on Domain Decomposition Methods took place at the University of Colorado at Boulder from August 10 to August 14, 1997. It was organized by Charbel Farhat, Department of Aerospace Engineering Science, Xiao-Chuan Cai, Department of Computer Science, both at the University of Colorado at Boulder, and Jan Mandel, Department of Mathematics at the University of Colorado at Denver.

Driven by the availability of powerful parallel processors, the field of Domain Decomposition has matured during the past ten years. The focus of new methods has been shifting from positive definite elliptic problems to complicated applications, nonlinear problems, systems, and problems with non-elliptic numerical behavior, such as wave propagation and the Helmholtz equation. At the same time, the advent of practical massively parallel computers poses new challenges for elliptic equations, especially on arbitrary, nonuniform meshes. These Proceedings contain contributions from all these areas. The focus of the Conference, as reflected in the selection of invited speakers, was on realistic applications in structural mechanics, structural dynamics, computational fluid dynamics, and heat transfer.

The Conference had 171 registered participants. There were 16 invited plenary lectures and 113 mini-symposia and plenary presentations. These proceedings contain 13 invited and 41 mini-symposia and contributed papers. All papers have been refereed. The Proceedings are divided into four parts. The first part contains invited papers. The rest of the volume contains mini-symposia and contributed presentations, further divided into Algorithms, Theory, and Applications.

Previous proceedings of the International Conferences on Domain Decomposition were published by SIAM, AMS, and John Wiley & Sons. We welcome the return of the Proceedings to AMS. We would like to acknowledge the help of the AMS staff in deciding the format and preparing the Proceedings. We would like to thank particularly Dr. Sergei Gelfand for encouraging us to abolish the page limit for invited presentations.

We wish to thank the members of the International Scientific Committee, and in particular the Chair, Petter Bjørstad, for their help in setting the scientific direction of the Conference. We are also grateful to the organizers of the mini-symposia for attracting high-quality presentations.

Timely production of these Proceedings would not have been possible without the cooperation of the authors and the anonymous referees. We would like to thank them all for their graceful and timely response to our various demands.

The organizers of the Conference would like to acknowledge the sponsors of the Conference, namely the National Science Foundation, ANSYS, Inc., the Sandia National Laboratories, the Colorado School of Mines, the University of Colorado at Boulder, and the University of Colorado at Denver. Their generous support made the Conference possible and, among other things, allowed the organizers to fund the participation of graduate students.

Finally, we would like to express our appreciation to Ms. Cathy Moser, the Secretary of the Conference, who made all organizational details run smoothly, and Dr. Radek Tezaur, the Technical Editor of these Proceedings, who finalized the formatting of the papers in AMS-LaTeX and prepared the whole book for printing.

The complete program of the Conference is available at the Conference Web site `http://www-math.cudenver.edu/dd10`. More related information, including links to other Domain Decomposition conferences and books, can be found at the Official Domain Decomposition Web site at `http://www.ddm.org`. The purchaser of this volume is entitled to the online edition of this book by AMS. To gain access, follow the instructions given on the form found in the back of this volume.

Jan Mandel
Charbel Farhat
Xiao-Chuan Cai

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This volume is divided into four parts: the first part contains invited papers (some of which survey developments over the past decade), and the other parts gather material from minisymposia and contributed presentations under three headings: Algorithms, Theory, and Applications.

**ISBN 0-8218-0988-1**