



Volume 10 Number 2
April 1996

AI EDAM

Artificial Intelligence for Engineering Design, Analysis and Manufacturing

Clive L. Dym, Editor

CAMBRIDGE
UNIVERSITY PRESS

EDITOR

CLIVE L. DYM
Harvey Mudd College

EDITORIAL BOARD

Alice M. Agogino, *University of California, Berkeley, CA*
 William P. Birmingham, *University of Michigan, Ann Arbor, MI*
 David C. Brown, *Worcester Polytechnic Institute, Worcester, MA*
 Per Christiansson, *Lund University, Sweden*
 Johan de Kleer, *Xerox Palo Alto Research Center, Palo Alto, CA*
 John R. Dixon, *University of Massachusetts, Amherst, MA*
 Boi Faltings, *Federal Institute of Technology, Lausanne, Switzerland*
 S. J. Fenves, *Carnegie Mellon University, Pittsburgh, PA*
 Donal Finn, *Hitachi Ltd., Dublin, Ireland*
 Patrick Fitzhorn, *Colorado State University, Fort Collins, CO*
 Mark S. Fox, *University of Toronto, Ontario, Canada*
 Felix Frayman, *Hewlett-Packard Laboratories, Vancouver, WA*
 John S. Gero, *University of Sydney, Australia*
 Roderick A. Grupen, *University of Massachusetts, Amherst, MA*
 John C. Kunz, *Stanford University, Stanford, CA*
 Jean-Claude Latombe, *Stanford University, Stanford, CA*
 Raymond E. Levitt, *Stanford University, Stanford, CA*
 Mary Lou Maher, *University of Sydney, Australia*
 John McDermott, *Digital Equipment Corporation, Marlborough, MA*

Sanjay Mittal, *Catalogics Software Corporation, Milpitas, CA*
 Wolfgang Nejd, *University of Hannover, Germany*
 Kiyoshi Niwa, *The University of Tokyo, Japan*
 Panos Papalambros, *University of Michigan, Ann Arbor, MI*
 H. Van Dyke Parunak, *Industrial Technology Institute, Ann Arbor, MI*
 Daniel R. Rehak, *Carnegie Mellon University, Pittsburgh, PA*
 Warren Seering, *Massachusetts Institute of Technology, Cambridge, MA*
 Ian Smith, *Federal Institute of Technology, Lausanne, Switzerland*
 Tim Smithers, *Universidad del Pais Vasco, Pais Vasco, Spain*
 E. Subrahmanian, *Carnegie Mellon University, Pittsburgh, PA*
 Jay M. Tenenbaum, *Enterprise Integration Technologies Corporation, Palo Alto, CA*
 Iris D. Tommelein, *University of Michigan, Ann Arbor, MI*
 David G. Ullman, *Oregon State University, Corvallis, OR*
 Manjula Waldron, *Ohio State University, Columbus, OH*
 Arthur W. Westerberg, *Carnegie Mellon University, Pittsburgh, PA*
 Graham Winstanley, *University of Brighton, Brighton, U.K.*

AIEDAM: Artificial Intelligence for Engineering Design, Analysis and Manufacturing is a journal intended to reach two audiences: *engineers and designers* who see AI technologies as powerful means for solving difficult engineering problems; and *researchers in AI and computer science* who are interested in applications of AI and in the theoretical issues that arise from such applications. The journal publishes original articles that develop new and interesting applications based on the most up-to-date research in all branches and phases of engineering, including analysis, synthesis and design; manufacturing and assembly; and concurrent engineering. Specifically, the journal is interested in the use of AI in planning, design, analysis, simulation, spatial reasoning and graphics, manufacturing, assembly, process planning, scheduling, numerical analysis, and optimization. Areas of special interest include:

- knowledge-based (expert) systems for engineering, including knowledge acquisition and representation, control, and system architectures
- theoretical work on the modeling of engineering problem-solving and design processes
- the integration of AI-based techniques with numerical analysis tools, graphics and solid modeling packages, and engineering databases
- engineering applications of knowledge-based vision and of natural language processing

AIEDAM is also interested in original and serious applications of state-of-the-art knowledge-based techniques to important engineering problems (termed *practicum papers*). In addition to the rapid publication and dissemination of unsolicited research papers, **AIEDAM** is committed to producing special issues on topics that are viewed as both important and timely.

Editorial Office: Clive L. Dym, Editor, **AIEDAM: Artificial Intelligence for Engineering Design, Analysis and Manufacturing**, Department of Engineering, Harvey Mudd College, Claremont, CA 91711, USA. Telephone: (909) 621-8853. Fax: (909) 621-8967. E-mail: Clive_Dym@hmc.edu.

Publishing, Subscription and Advertising Offices: Cambridge University Press, 40 West 20th Street, New York, NY 10011, USA; and (outside the US and Canada) Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, England.

AIEDAM is published five times a year. Annual institutional subscription rates: US \$210.00 in the US, Canada, and Mexico; UK £120.00 + VAT elsewhere. Individual rates: US \$92.00 in the US, Canada, and Mexico; UK £55.00 + VAT elsewhere. Single part rates: US \$47.00 in the US, Canada, and Mexico; UK £28.00 + VAT elsewhere. Prices include postage and insurance.

Copyright © 1996 Cambridge University Press

All rights reserved. No part of this publication may be reproduced, in any form or by any means, electronic, photocopying or otherwise, without permission in writing from Cambridge University Press. *Photocopying information for users in the U.S.A.:* The Item-Fee Code for this publication (0890-0604/96 \$11.00 + .10) indicates that copying for internal or personal use beyond that permitted by Sec. 107 or 108 of the U.S. Copyright Law is authorized for users duly registered with the Copyright Clearance Center (CCC) Transaction Reporting Service, provided that the appropriate remittance per article is paid directly to: CCC, 222 Rosewood Drive, Danvers, MA, 01923. Specific written permission must be obtained for all other copying.

Printed in the United States of America.

Second class permit pending at New York, NY, and additional mailing offices. Postmaster: send address changes in the US, Canada, and Mexico to: **AIEDAM: Artificial Intelligence for Engineering Design, Analysis and Manufacturing**, Journals Department, Cambridge University Press, 110 Midland Avenue, Port Chester, NY 10573-4930.



VOLUME 10

APRIL 1996

NUMBER 2

SPECIAL ISSUE

Machine Learning in Design

Guest Editors

ALEX H.B. DUFFY

DAVID C. BROWN

MARY LOU MAHER

