



OPTIMIZATION AND EM SIMULATORS

John W. Bandler

PO Box 8083, Dundas, Ontario, Canada L9H 5E7

905 628 9671

Fax 905 628 1578

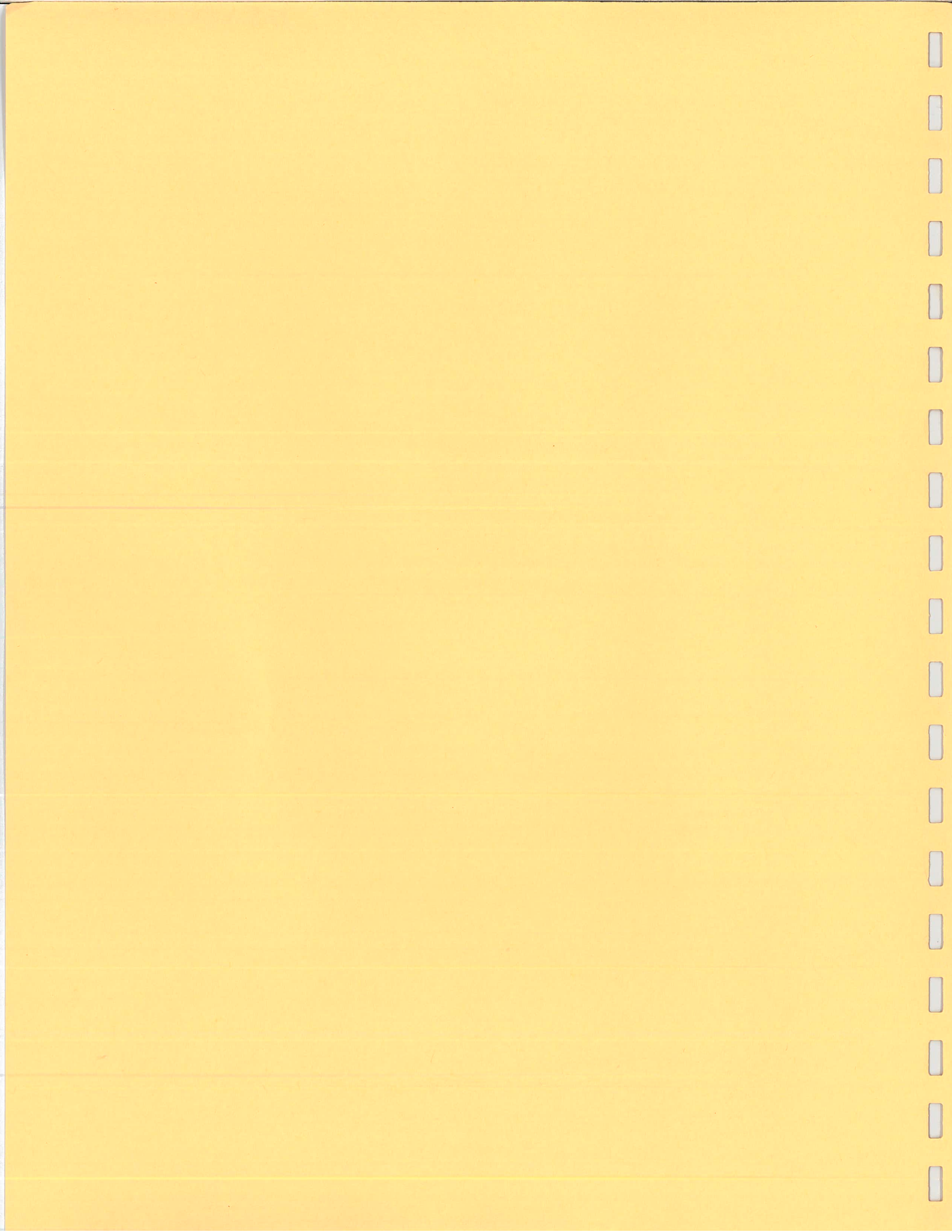
john@bandler.com

www.bandler.com

presented at

Panel Session on Research Directions in Microwave CAD

1998 IEEE MTT-S Int. Microwave Symposium, Baltimore, MD, June 9, 1998



OPTIMIZATION AND EM SIMULATORS

John W. Bandler

BC-98-5-V

June 1998

© Bandler Corporation 1998

No part of this document may be copied, translated, transcribed or entered in any form into any machine without written permission. Address enquiries in this regard to Dr. J.W. Bandler. Excerpts may be quoted for scholarly purposes with full acknowledgement of source. This document may not be lent or circulated without this title page and its original cover.



OPTIMIZATION AND EM SIMULATORS

John W. Bandler

PO Box 8083, Dundas, Ontario, Canada L9H 5E7

905 628 9671

Fax 905 628 1578

john@bandler.com

www.bandler.com

presented at

Panel Session on Research Directions in Microwave CAD

1998 IEEE MTT-S Int. Microwave Symposium, Baltimore, MD, June 9, 1998

Design Technologies for Manufacturability

relevant optimization approaches include design with manufacturing tolerances, tolerance assignment, design centering, yield-driven design and optimization of tunable/toleranced circuits

it has been 30 years since design with tolerances made its formal appearance in the arena of CAD of electronic circuits

such design technologies are crucial not only for massively manufactured circuits but also for improving the probability of first-pass success in designs for small volume production

this area has long been an academic theme of research but does not appear to be widely practised by the microwave industry

it is possible not only to optimize circuits using commercial EM simulators (*OSA's Empipe & Empipe3D, HP HFSS Version 5.2*) but also to assign manufacturing tolerances and optimize yield using EM simulations in a virtual loop

the microwave industry should take more serious interest - there is much university/industry research left to do

Vision of the Future of Microwave CAE

computer-integrated manufacturing, including CAD, CAM, information management and decision support systems will be a reality facing the design engineer in the next century

CAE will be physically and electromagnetically based, to include electrical, mechanical and thermal effects

CAE tools will concurrently link geometry, layout, physical, EM and process simulations, with performance, yield, cost, system specifications, manufacturability and testability transparently to the designer

CAE tools will enable automatic EM optimization of arbitrary geometrical shapes

Directions of Future Research in CAD

a new look at Design Centering, Tolerancing and Tuning (DCTT) using mathematical optimization

Space Mapping based device modeling and circuit optimization exploiting EM simulators and empirical models (*J.W. Bandler*)

knowledge based Neural Modeling for microwave design, including empirical or semianalytical information (*Q.J. Zhang, Carleton University*)

fault diagnosable CAE for manufacturability and maintainability

integration of device, circuit and EM analyses (*M.B. Steer, T. Itoh*)

the industrial challenge is to integrate all the above into a seamless commercial CAE environment

Design Centering, Tolerancing and Tuning using Mathematical Optimization

(Bandler and Abdel-Malek, 1978)

