Visit to Delft Centre for CSE

Martin Peters

Mathematics Editorial IV
Springer-Verlag
Delft, 1st April, 2010

CSE BOOKS


Mathematics and Visualization
Geometry and Computing
Mathematics in Industry
HLRS BOOKS
LRZ BOOKS
LNCSE
TCSE
MCSE

Springer CSE series

LNCSE: Was initiated at ICIAM 1995, volume 1 published 1997

Cross-disciplinary team of editors

Diversification with TCSE and MCSE

LECTURE NOTES IN COMPUTATIONAL SCIENCE AND ENGINEERING 71

Barry Koren · Kees Vuik Editors

Advanced Computational Methods in Science and Engineering

Springer

Book types in LNCSE

monograph

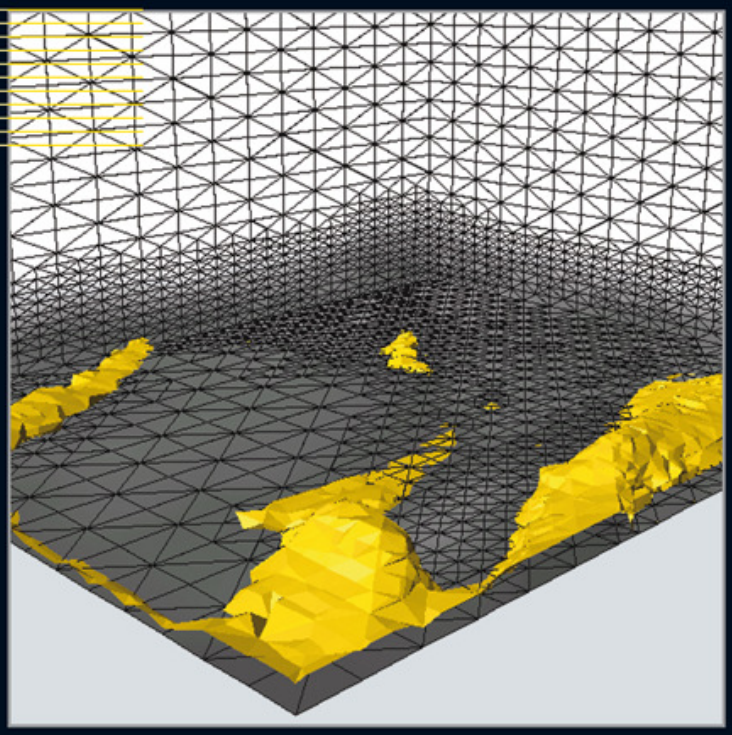
proceedings

invited multi-author volume

tutorials

Lecture Notes in Computational Science and Engineering

54



Jörn Behrens

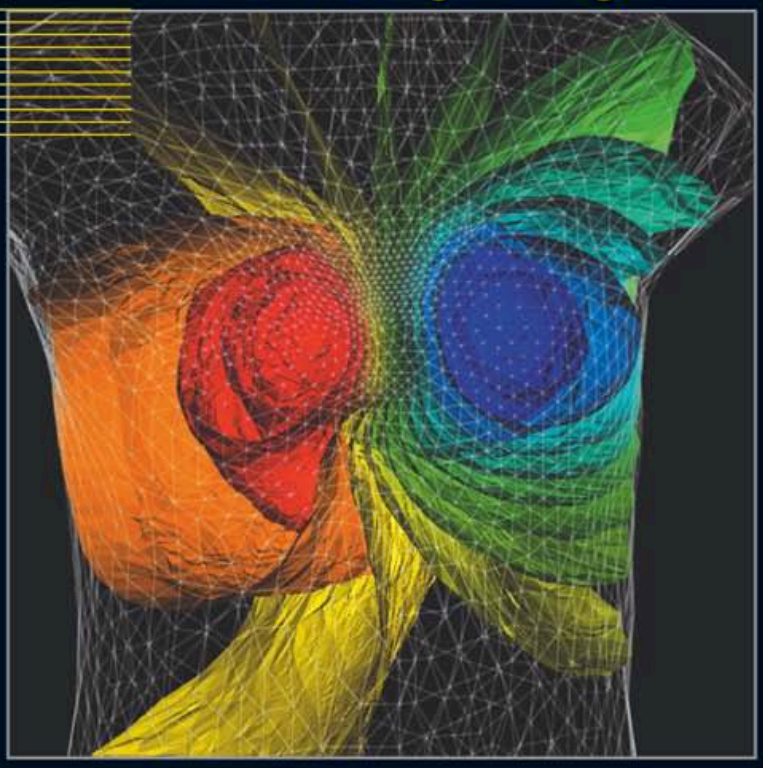
Adaptive Atmospheric Modeling

Key Techniques in Grid Generation, Data Structures, and Numerical Operations with Applications

Springer

Monographs in Computational Science and Engineering

1



Joakim Sundnes
Glenn Terje Lines
Xing Cai
Bjørn Fredrik Nielsen
Kent-Andre Mardal
Aslak Tveito

Computing the Electrical Activity in the Heart

Springer

Series of proceedings

Domain Decomposition

Meshfree Methods

ICOSAHOM

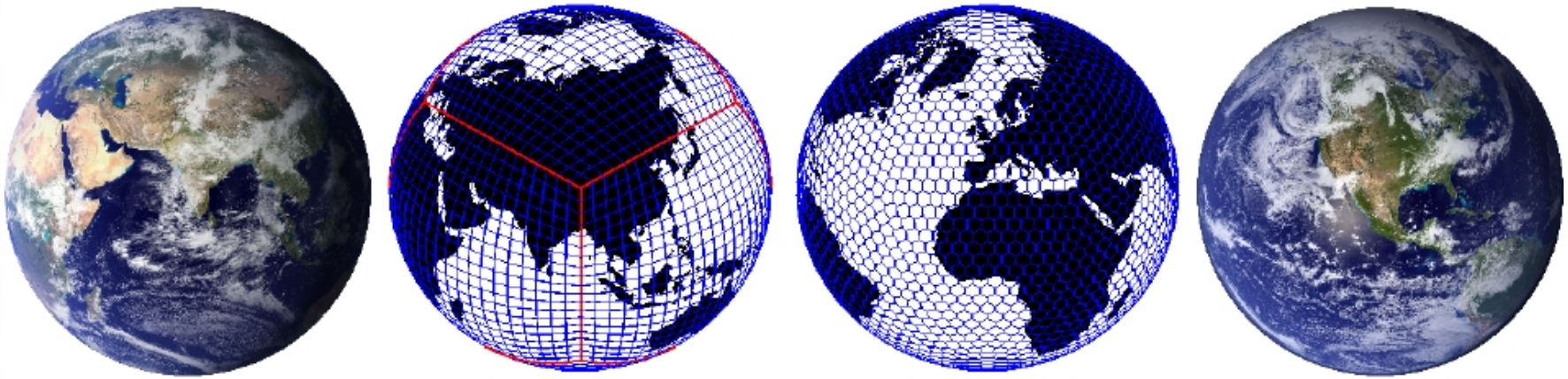
Home
Publications
Curriculum Vitae
Colloquium
Springer LNCSE
CAM model
Useful pointers
Contact
NCAR

People at NCAR: Peter Hjort Lauritzen

Book in Lecture Notes in Computational Science and Engineering series published by Springer entitled

Numerical Techniques for Global Atmospheric Models

Editors: Peter H. Lauritzen (NCAR), Christiane Jablonowski (University of Michigan), Mark Taylor (Sandia National Laboratories) and Ramachandran D. Nair (NCAR)



(book is currently in preparation; tentative publication date: 2010)

This book surveys recent developments in numerical techniques for global atmospheric models. It is based upon a collection of lectures prepared by leading experts in the field. The chapters reveal the multitude of steps that determine the global atmospheric model design. They encompass the choice of the equation set, computational grids on the sphere, horizontal and vertical discretizations, time integration methods, filtering and diffusion mechanisms, conservation properties, tracer transport, and considerations for designing models for massively parallel computers. A reader interested in applied numerical methods but also the many facets of atmospheric modeling should find this book of particular relevance.

Table of contents (tentative)

Part I: Equations of motion and some basic ideas on discretizations

Some basic dynamics relevant to the design of atmospheric model dynamical cores
J.Thuburn, University of Exeter, UK.

Waves, hyperbolicity and characteristics

J.Tribbia, National Center for Atmospheric Research, USA.

Horizontal discretizations: some basic ideas
J.Thuburn, University of Exeter, UK.

Vertical discretizations: some basic ideas
J.Thuburn, University of Exeter, UK.

Time discretization: some basic ideas
D.R.Durran, University of Washington, USA.

Stabilizing fast waves
D.R.Durran, University of Washington, USA.

Part II: Conservation laws, finite-volume methods, remapping techniques and spherical grids

Transport: A finite-volume perspective of scalar and vorticity advection
T.Ringler, Los Alamos National Laboratory, USA.

Atmospheric transport schemes: Desirable properties and a semi-Lagrangian view on finite-volume discretizations
P.H.Lauritzen, National Center for Atmospheric Research, USA.
P.Ullrich, University of Michigan, USA.
R.D.Nair, National Center for Atmospheric Research, USA.

Emerging methods for conservation laws for atmospheric modeling
R.D.Nair, National Center for Atmospheric Research, USA.
M.Levy, University of Colorado, USA.
P.H.Lauritzen, National Center for Atmospheric Research, USA.

Triangles, squares and hexagons
T.Ringler, Los Alamos National Laboratory, USA.

Part III: Some aspects of atmospheric dynamical cores

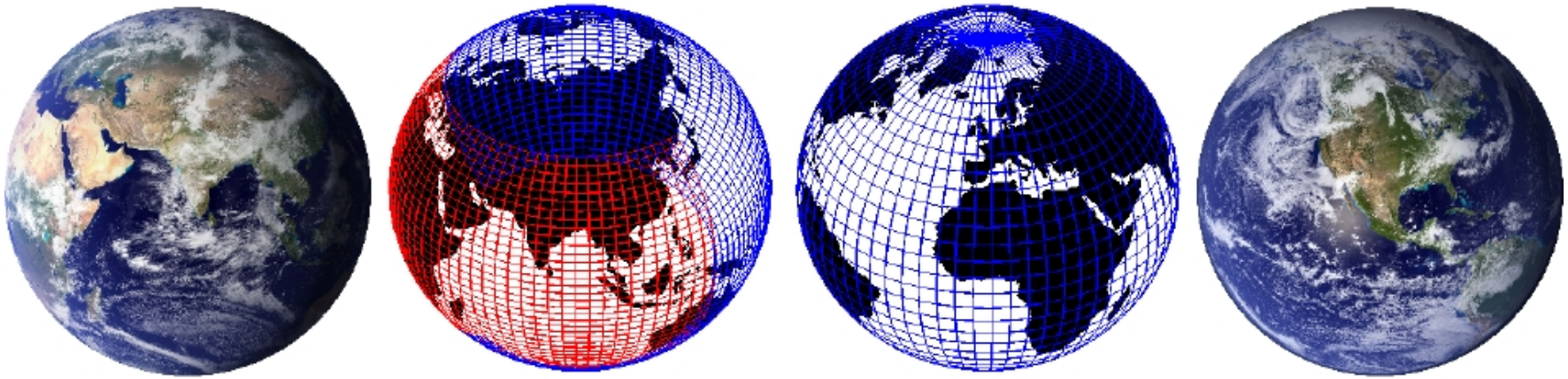
Conservation in dynamical cores: What, how, and why?
J.Thuburn, University of Exeter, UK.

The pros and cons of filters, diffusion and damping mechanisms
C.Jablonowski, University of Michigan, USA.

Kinetic energy spectra and model filters
W.Skamarock, National Center for Atmospheric Research, USA.

The design of dynamical cores
R.B.Rood, University of Michigan, USA.

Scaling climate models to the petascale
J.Dennis & R.Loft, National Center for Atmospheric Research, USA.



Links:
NCAR
Personal home page of Peter Hjort Lauritzen

Last updated: 24-June-2008

Future Developments

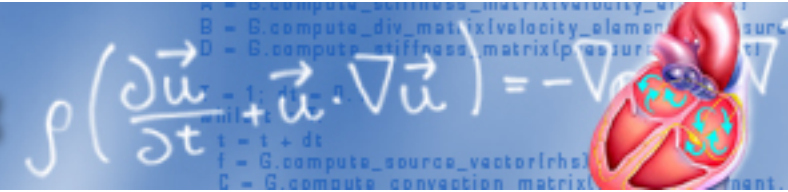
bioscience/medicine

geoscience

expand tutorials

Norwegian Center of Excellence

Center for Biomedical Computing



Example of CS&E: Application in Medicine

Springer
the language of science

- Joint effort by SIMULA Research Laboratory (a major CS&E institute) and Rikshospitalet, Oslo
  - Phase 1: Computation of the electromagnetic field on the surface of the body (based on the electromagnetic field of the human heart)
  - Phase 2: (The inverse problem) – given the electromagnetic field on the surface of the patient's body, compute it for the heart and, and form a diagnosis