Editorial

Axel Ruhe

Published online: 15 November 2011
© Springer Science + Business Media B.V. 2011

In this issue we publish the second and final installment of eight talks from the BIT50 conference that was held in Lund Summer 2010, together with five papers from the BIT regular supply. And we end the year with acknowledging those that have helped us to make BIT what it is today.

BIT50 second part

Let me first bring you back to Lund! In one contributed session talk, *Ben Cumming*, *Timothy J Moroney*, and *Ian W Turner* describe a mass conserving finite volume method for the Richards' equation that models flow in heterogeneous porous media, time stepped with a backward differentiation DAE, differential algebraic equation, solver. Tests are reported from two groundwater filtration applications.

In another talk in the same session, *Xin He*, *Maya Neytcheva*, and *Stefano Serra Capizzano* discuss the numerical solution of the linear systems that occur when solving a linearized Navier Stokes or Oseen equation for multiphase flow problems, modeled with a finite element approximation. The systems are blocked and indefinite, and the choice of parameters in a blocked and indefinite preconditioner is studied.

Our third talk over a scientific computation problem is presented by *Dexuan Xie*, and *L. Ridgway Scott*, who treat a molecular electrostatic problem with a Poisson dielectric model, connecting charge, polarization, displacement and electric fields. A model problem consists of a sphere separating two different dielectric materials and a point charge outside, inside or on the sphere. They use a piecewise constant finite element model for the computations.

A. Ruhe (✉)

School of Computer Science and Communications (CSC), Royal Institute of Technology (KTH),
100 44 Stockholm, Sweden
e-mail: ruhe@kth.se

From the minisymposium on Evolution Equations, *Marlis Hochbruck* and *Alexander Ostermann* investigate exponential multistep methods of Adams type, where a Krylov method is used to approximate the matrix exponential and interpolation to handle nonlinearity. Error estimates are given for stiff systems, using analytic semi-groups in a Banach space context.

Willem Hundsdorfer, *Anna Mozartova*, and *Marc Spijker* study how to choose step size in a general linear method, so that the numerical solution inherits some natural boundedness properties of the analytical solution. These boundedness properties are related to total variation boundedness and monotonicity. It is important that the step size conditions are easy to verify during the computation.

In our third talk about time stepping dynamical systems, *Klas Modin* and *Gustaf Söderlind* analyze explicit and semi-explicit geometric integration schemes for dissipative perturbations of Hamiltonian systems. They prove conditions for monotonic decrease of a Hamiltonian function and conservation of relative equilibrium.

Two talks concern matrix computations. *Elias Jarlebring* and *Wim Michiels* solve a nonlinear matrix eigenvalue problem by residual inverse iteration. Bounds on convergence factors are derived, and the influence of the projection direction defining the Rayleigh functional is investigated. *Vedran Novaković* and *Sanja Singer* describe how to use a GPU, massively parallel graphic processor, to compute the singular value decomposition of a rectangular matrix, using a hyperbolic one sided Jacobi algorithm. They compare their approach to standard MPI, message passing, implementations.

Regular papers

Our first regular paper by *Carolina Vittoria Beccari*, *Giulio Casciola*, and *Lucia Romani* treats non uniform spline interpolation. The knots are fixed but edge parameters are varied, to get desirable shape and approximation order, when refining the subdivision.

Simone Cifani, *Espen R. Jakobsen*, and *Kenneth H. Karlsen* use a discontinuous Galerkin method to solve degenerate convection diffusion problems in one space dimension. They derive stability estimates and prove convergence to entropy solutions for several linear and nonlinear problems.

Carl Christian Kjelgaard Mikkelsen uses an extended Krylov subspace iteration to find a solution of a matrix Lyapunov equation. He shows that any prescribed convergence curve can be achieved for a certain choice of matrix and right hand side.

Harry Smith and *David B Hunter* discuss numerical evaluation of the error term of a Clenshaw-Curtis quadrature with a Gegenbauer weight function.

Joris Van Deun and *Lloyd N. Trefethen* have implemented a robust algorithm for the Caratheodory-Fejer almost best rational approximation over a finite interval. It is much easier to compute than the Remez type algorithm that is used to find the best approximation, and the error curve looks just about the same. It is a part of the *chebfun* extension to Matlab.

Editorial board

We thank Anders Szepessy for nine years service on our editorial board! He has made BIT one of the prime publication channels for the expanding field of stochastic

differential equations, SDE. We hope to stay that way, helped by those that remain on the editorial board, and wish Anders success in his new endeavors.

Referees

Now at the end of the year, let me take the opportunity to say thank you to all that have acted as referees during 2011. Your service is essential for the quality of BIT! You are anonymous to the authors and I hope that helps to keep the focus on the actual content of each manuscript. But you are my good friends and most respected experts. We all make up the BIT family, editors referees, authors and publication staff!

Those are the ones listed in the BIT files:

Mark Ainsworth	Etienne Emmrich
Giovanni Allesandrini	Stefan Engblom
Bradley Alpert	Radek Erban
Alan L. Andrew	Jean-luc Fattebert
Martin Arnold	Leslie Foster
Mohammad Asadzadeh	Paolo Ghelardoni
Christopher G. Baker	Nicholas I.M. Gould
Jaydeep P. Bardhan	Stef Graillat
Domingo Barrera	Volker Grimm
Alex Bespalov	Luka Grubisic
Marta M. Betecke	Serkan Gugercin
Ernesto Birgin	Nicola Guglielmi
Matthias Bollhöfer	Chun-Hua Guo
Rüdiger Borsdorf	Weihong Guo
Hermann Brunner	Stefan Güttel
Hans-Joachim Bungartz	Mahmoud Hadizadeh
Kevin Burrage	Ernst Hairer
Manuel Calvo	Martin Hanke
Martin Campos Pinto	Eskil Hansen
Thomas Cashman	Anders Christian Hansen
Snorre H. Christiansen	Markus Hegland
David Cohen	Fred J. Hickernell
Ronald Cools	Desmond J. Higham
Yu-Hong Dai	Inmaculada Higuera
Johan De Villiers	Illia Horenko
Arnaud Debussche	Jingfang Huang
Bert Debusschere	Thomas Huckle
Tom De Lillo	Mohamed E. Hussein
Georg Denk	Daan Huybrechs
Howard Elman	Arieh Iserles

Zdzislaw Jackiewicz	Mathias Rousset
Pavel Jiranek	Miroslav Rozložnik
Bo Kågström	Tobias Ryden
Conall Kelly	Driss Sbibi
Runhild A. Klausen	Thorsten Sickenberger
Leonid Knizhnerman	Kunigert G. Siebert
Vladik Kreinovich	Valeria Simoncini
Michal Křížek	Ivan Slapničar
Philippe Langlois	Hendrik Speleers
Stig Larsson	Andreas Stathopoulos
Melvin Leok	Roksolyana Stolyarchuk
Ren-Cang Li	Zdenek Strakos
Hui-Yuan Li	Endre Suli
Hui Liang	Magnus Svärd
Fu-rong Lin	Frederic Truchetet
Stephen Mann	Miroslav Tůma
Kent-Andre Mardal	Petr Vabishchevich
Günter Mayer	Bart Vandereycken
Carl Christian Kjelgaard Mikkelsen	Stefan Vandewalle
David Nicholls	Gilles Vilmart
Jan Nordström	Martin Vohralik
Sotirios Notaris	Zhongqing Wang
César Palencia	Li-Lian Wang
Bor Plestenjak	Shuhuang Xiang
Christophe Rabut	Hongguo Xu
Giuseppe Rodriguez	Igor Zagorodnov
Jiri Rohn	Jens-Peter M. Zemke
Joost Rommes	Zhimin Zhang
Hans-Goerg Roos	
James Rossmanith	

Thank you all for this year and see you later for BIT!

Axel Ruhe