The Institute of Mathematics and its Applications
Third International Conference on
Boundary Integral Methods: Theory and Applications
Tuesday 14 to Saturday 18 September, 2004
University of Reading

incorporating an

Interdisciplinary Workshop on Developments in
Boundary Element Methods for Acoustics and Electromagnetics
Wednesday 15 to Saturday 18 September, 2004

Final Programme

N.B. All lectures, lunch, tea, coffee are held in the New Agriculture Building, the lectures taking place in the Nike and Madejski Lecture Theatres.

TUESDAY

<table>
<tr><td colspan="2">8.30 onwards, Foyer Agriculture Building: Registration</td></tr>
<tr><td colspan="2">9.30-10.30 Nike LT: W McLean: Short Course on Strongly Elliptic Systems and Boundary Integral Equations
Lecture 1: Elliptic PDEs and Sobolev Spaces. Chair: SN Chandler-Wilde</td></tr>
<tr><td colspan="2">10.30-11.00 1L08 Coffee</td></tr>
<tr><td colspan="2">11.00-12.00 Nike LT W McLean Lecture 2: Fredholm Property and Elliptic BVPs. Chair: IG Graham</td></tr>
<tr><td colspan="2">12.00-1.00 Nike LT W McLean Lecture 3: Surface Potentials. Chair: IG Graham</td></tr>
<tr><td colspan="2">1.00-2.00 1L08 Lunch</td></tr>
<tr><td colspan="2">2.00-2.15 Madejski LT Opening/Welcome, Prof David Porter, Dean of the Faculty of Science</td></tr>
<tr><td colspan="2">2.15-2.55 Madejski LT. Chair: SN Chandler-Wilde
C Schwab Wavelet Galerkin Methods for Boundary Integral Equations with Stochastic Data</td></tr>
<tr><td>Matrix Compression Methods Chair: SN Chandler-Wilde
Madjeski Lecture Theatre</td><td>Fluid Mechanics Chair: M McIver
Nike Lecture Theatre</td></tr>
<tr><td>3.00-3.20 IG Graham
Panel Clustering on Degenerate Meshes</td><td>3.00-3.20 N Kuznetsov An Indefinite Integral Equation Without Irregular Frequencies for the Floating-Body Problem</td></tr>
<tr><td>3.20-3.40 S Börm $\mathcal{H}^2$-Matrices with Adaptive Bases</td><td>3.20-3.40 <u>A Curteanu</u>, DB Ingham, L Elliott & D Lesnic Boundary Element Method and Laplacian Decomposition for Solving Stokes Problems</td></tr>
<tr><td colspan="2">3.40-4.10 1L08 Tea/Coffee</td></tr>
<tr><td colspan="2">4.10-4.50 Madejski LT. Chair: M McIver
J-M Vanden-Broeck Three and Two Dimensional Nonlinear Free Surface Flows</td></tr>
<tr><td colspan="2">6.00 Windsor Hall Dinner</td></tr>
<tr><td colspan="2">8.00-9.00pm Nike LT W McLean Lecture 4: Boundary Integral Equations. Chair: IG Graham</td></tr>
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WEDNESDAY A.M.

<table>
<tr><td colspan="2">9.00-9.40 Madejski LT. Chair C Schwab
WL Wendland On J. Radon's Convergence Proof for C. Neumann's Method with Double Layer Potentials</td></tr>
<tr><td>Analysis Chair: C Schwab
Madjeski Lecture Theatre</td><td>Stokes Problem Chair: J-M Vanden-Broeck
Nike Lecture Theatre</td></tr>
<tr><td>9.45-10.05 G Kresin & V Maz'ya Best Constants in the Miranda-Agmon Inequalities for Solutions of Elliptic Systems and the Classical Maximum Modulus Principle for Fluid and Elastic Half-Spaces</td><td>9.45-10.05 N Heuer An Adaptive Boundary Element Method for the Exterior Stokes Problem</td></tr>
<tr><td>10.05-10.25 T Shaposhnikova Application of Sobolev Multipliers in a Non-Smooth L_p Theory of Classical Boundary Integral Equations</td><td>10.05-10.25 A Di Gioia, A Frangi & G Novati A Qualocation Enhanced Approach for the Dirichlet Problem of Exterior Stokes Flow and Incompressible Elasticity</td></tr>
<tr><td colspan="2">10.25-11.00 1L08 Coffee</td></tr>
<tr><td>Analysis Chair: WL Wendland
Madjeski Lecture Theatre</td><td>Numerical Analysis Chair: R Potthast
Nike Lecture Theatre</td></tr>
<tr><td>11.00-11.20 R Duduchava Boundary Integral Equations on Non-Smooth Curves</td><td>11.00-11.20 JM Melenk Boundary Concentrated FEM</td></tr>
<tr><td>11.20-11.40 F-O Speck Diffraction by Rectangular Wedges from the Viewpoint of Operator Theory</td><td>11.20-11.40 R Celorrio, T Hohage & F-J Sayas Boundary Element Solution of a Parabolic Equation Based on the Laplace Transform</td></tr>
<tr><td>11.40-12.00 M Lindner Limit Operators and Applications</td><td>11.40-12.00 G Vainikko Fast Solvers of Periodic Integral Equations of the Second Kind</td></tr>
<tr><td colspan="2">12.05-12.45 Madjeski LT. Chair: IG Graham
V Maz'ya (IMA Distinguished Lecturer)
Boundary Value Problems for the Stokes and Navier-Stokes Systems in a Polyhedral Domain</td></tr>
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WEDNESDAY P.M.

<table>
<tr><td colspan="2">12.45-2.00 1L08 Lunch</td></tr>
<tr><td colspan="2">2.00-2.05 Madjeski LT WORKSHOP: Introductory Remarks IG Graham</td></tr>
<tr><td colspan="2">2.05-2.45 Madjeski LT. Chair: PA Martin
M Duran, I Muga & J-C Nédélec Half-Space Helmholtz Equation with Impedance</td></tr>
<tr><td>WORKSHOP: Unbounded domains and multiple scattering Chair: KV Horoshenkov
Madjeski Lecture Theatre</td><td>Numerical Analysis Chair: JM Melenk

Nike Lecture Theatre</td></tr>
<tr><td>2.50-3.10 M McIver Embedded Trapped Modes in Acoustic Waveguides</td><td>2.50-3.10 JT Beale Computing with Singular and Nearly Singular Integrals</td></tr>
<tr><td>3.10-3.30 CM Linton & PA Martin Multiple Scattering by Random Configurations of Circular Cylinders: Integral Equations and Forests</td><td>3.10-3.30 M Rech & M Griebel Efficient Nearfield Cubature in the Galerkin BEM</td></tr>
<tr><td colspan="2">3.30-4.00 1L08 Tea</td></tr>
<tr><td>WORKSHOP Chair: PA Martin
Madjeski Lecture Theatre</td><td>Numerical Analysis Chair: W McLean
Nike Lecture Theatre</td></tr>
<tr><td>4.00-4.20 B Schappel A Diffraction Problem in the Half-Space: Solving the Forward and the Inverse Problem</td><td>4.00-4.20 C Schneider Stable Quadrature Rules for Qualocation</td></tr>
<tr><td>4.20-4.40 VP Smyshlyaev High Frequency Scattering of Electromagnetic Creeping Waves by Conical Points</td><td>4.20-4.40 J Saranen & J Anttila The Boundary Element Spline Collocation for Non-Uniform Meshes on Torus</td></tr>
<tr><td>4.40-5.00 PJ Harris, K Chen & J Cheng A Weakly-Singular Piecewise Linear and Quadratic Collocation Method for Solving the Exterior Helmholtz Problem Valid for all Real and Positive Wavenumbers</td><td>4.40-5.00 PE Ricci & P Natalini Computation of the Eigenvalues of Fredholm-Stieltjes Integral Equations</td></tr>
<tr><td>5.00-5.20 SK Kanaun & S Babaii Kochekseraii
A Numerical Method of the Solution of the Integral Equations of Electrostatics and Electromagnetic Wave Propagation Based on Gaussian Approximating Functions</td><td></td></tr>
<tr><td colspan="2">6.00 Windsor Hall Dinner</td></tr>
<tr><td colspan="2">8.00-9.00pm Reception in Cole Museum of Zoology</td></tr>
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THURSDAY A.M.

<table>
<tr><td colspan="2">9.00-9.40 Madejski LT. Chair: WL Wendland
D Natroshvili Mathematical Problems of the Elasticity Theory of Chiral Materials</td></tr>
<tr><td>WORKSHOP: High Frequency Methods
Madjeski Lecture Theatre. Chair: WL Wendland</td><td>Adaptive Methods Chair: SN Chandler-Wilde
Nike Lecture Theatre</td></tr>
<tr><td>9.45-10.05 E Perrey-Debain On the Conditioning and Convergence Estimates of the Real Plane Wave Basis: a Simple Study Case</td><td>9.45-10.05 K Maleknejad & H Mesgarani Boundary Element Method for First Kind Integral Equations</td></tr>
<tr><td>10.05-10.25 E Darrigrand & P Monk Ultra-Weak Variational Formulation and Integral Representation Using a Fast Multipole Method for the Equations of Electromagnetism</td><td>10.05-10.25 E Malsch Smooth and Linear Surface Interpolations Applied to 3D Boundary Elements</td></tr>
<tr><td colspan="2">10.25-11.00 1L08 Coffee</td></tr>
<tr><td>WORKSHOP: Optical tomography Chair: M Bonnet
Madjeski Lecture Theatre</td><td>Matrix Compression Methods Chair: T Arens
Nike Lecture Theatre</td></tr>
<tr><td>11.00-11.20 J Heiskala, J Sikora & SR Arridge Different Implementations of BEM for Diffuse Optical Tomography: a Comparison Study</td><td>11.00-11.20 M Bebendorf Fast Iterative or Fast Direct Solution of Boundary Element Systems</td></tr>
<tr><td>11.20-11.40 J Sikora, SR Arridge, J Ripoll, AD Zacharopoulos & JD Riley Light Propagation in Diffusive Media with Non-Scattering Regions Using 3D BEM</td><td>11.20-11.40 L Banjai & W Hackbusch $\mathcal{H}^2$-Matrices for High Frequency Helmholtz Equation</td></tr>
<tr><td>11.40-12.00 AD Zacharopoulos, J Sikora & SR Arridge Reconstruction of 3D Region Boundaries in Optical Tomography Using Parametric Surfaces and BEM</td><td>11.40-12.00 L Grasedyck Adaptive Coarsening and Preconditioning of BEM Stiffness Matrices</td></tr>
<tr><td colspan="2">12.00-12.30 Madjeski LT Discussion Session on Collaborating Successfully with Industry. Chair: R Potthast</td></tr>
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THURSDAY P.M.

<table>
<tr><td colspan="2">12.30-2.00 1L08 Lunch</td></tr>
<tr><td colspan="2">2.00-2.40 Madjeski LT. Chair: P Davies
E Michielssen Progress in Plane Wave Time Domain Accelerated Integral Equation Solvers</td></tr>
<tr><td>*WORKSHOP: Micromagnetics* Chair: P Davies
Madjeski Lecture Theatre</td><td>*Wavelet Methods* Chair: K Chen
Nike Lecture Theatre</td></tr>
<tr><td>2.45-3.05 **C Carstensen & D Praetorius** Numerical Analysis of an Integral Equation for Macroscopic Simulations of Micromagnetics for the Large-Soft Limit</td><td>2.45-3.05 **R Schneider** Shape Optimization using Wavelet BEM</td></tr>
<tr><td>3.05-3.25 **S Funken** FEM-BEM Coupling in Micromagnetics</td><td>3.05-3.25 **S Amini, R Elmazuzi & SP Nixon** Multiwavelet Collocation for Boundary Integral Equations</td></tr>
<tr><td colspan="2">3.25-4.00 1L08 Tea</td></tr>
<tr><td>*WORKSHOP: Time Domain Methods*
Madjeski Lecture Theatre. Chair: E Michielssen</td><td>*Wavelet Methods* Chair: R Schneider
Nike Lecture Theatre</td></tr>
<tr><td>4.00-4.20 **Y Otani, T Takahashi & N Nishimura** A Time Domain Fast Boundary Integral Equation Method for 3D Elastodynamics</td><td>4.00-4.20 **S Amini, SP Nixon & PR Rajaguru** Multiwavelet Galerkin Boundary Element Solution of Laplace's Equation</td></tr>
<tr><td>4.20-4.40 **PJ Davies & DB Duncan** The Stability of Numerical Approximations of the Time Domain Current Induced on Thin Wire and Strip Antennas</td><td>4.20-4.40 **D Huybrechs & S Vandewalle** Wavenumber Dependence of the Wavelet Method for High Frequency Integral Equations</td></tr>
<tr><td colspan="2">4.45-5.25 Madjeski LT. Chair: R Schneider
W Dahmen Adaptive Wavelet Methods for Boundary Integral Equations</td></tr>
<tr><td colspan="2">6.30 Windsor Hall Dinner</td></tr>
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FRIDAY A.M.

<table>
<tr><td colspan="2">9.00-9.40 Madejski LT. Chair: DB Ingham
P Bettess, E. Perry-Debain, O Lagrouche, J Trevelyan & J Shirron
Plane Wave Basis Boundary Elements and Finite Elements
for Wave Scattering Problems</td></tr>
<tr><td>WORKSHOP: Rough surfaces and Diffraction Gratings Chair: DB Ingham
Madjeski Lecture Theatre</td><td>Inverse Problems Chair: M Bonnet

Nike Lecture Theatre</td></tr>
<tr><td>9.45-10.05 P Monk Variational Methods for Rough Surface Scattering</td><td>9.45-10.05 R Kress & P Serranho A Hybrid Method for 2D Sound-Soft Crack Reconstruction</td></tr>
<tr><td>10.05-10.25 T Arens, SN Chandler-Wilde & JA DeSanto First Kind Integral Equation Methods for Scattering by a Periodic Surface</td><td>10.05-10.25 A Rap, L Elliott, DB Ingham, D Lesnic & X Wen Boundary Element Method for Inverse Source Convection-Diffusion Problems</td></tr>
<tr><td colspan="2">10.25-11.00 1L08 Coffee</td></tr>
<tr><td>WORKSHOP: FEM - BEM Coupling
Madjeski Lecture Theatre. Chair: C Carstensen</td><td>Applications Chair: D Lesnic
Nike Lecture Theatre</td></tr>
<tr><td>11.00-11.20 R Hiptmair & P Meury Stable FEM-BEM Coupling for Helmholtz Transmission Problems</td><td>11.00-11.20 U Eberwien & G Beer Efficient Calculation of Internal Results for 2D and 3D Elasticity BEM - Theory and Applications</td></tr>
<tr><td>11.20-11.40 A Bendali & M Fares A FETI-like Domain Decomposition Procedure for Coupling Large Scale Finite Element-Boundary Element Formulations in Acoustic Scattering</td><td>11.20-11.40 J Iannelli An Exact Kutta Condition Enforcing Boundary Integral Method for Single- and Multi-Element Lifting-Aerofoil Aerodynamics</td></tr>
<tr><td>11.40-12.00 N Zerbib & A Bendali Application of the Fast Multipole Method and a New Procedure for the Computation of CFIE Matrices to a Hybrid Finite Element - Boundary Element Solution of an Electromagnetic Scattering Problem</td><td>11.40-12.00 J Gwinner Some Recent Advances in the Treatment of Unilateral Boundary Problems by Boundary Integral Methods</td></tr>
<tr><td colspan="2">12.00-12.30 Madjeski LT Discussion Session on
Future Research Directions in Computational Acoustics and Electromagnetics. Chair: PA Martin</td></tr>
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FRIDAY P.M.

<table>
<tr><td colspan="2">12.30-2.00 1L08 Lunch</td></tr>
<tr><td colspan="2">2.00-2.40 Madjeski LT. Chair: K Chen
O Bruno New High-Order, High-Frequency Methods in Computational Electromagnetics</td></tr>
<tr><td>*WORKSHOP: High Frequency Methods* Chair: K Chen
Madjeski Lecture Theatre</td><td>*Domain Equation Methods* Chair: JM Melenk
Nike Lecture Theatre</td></tr>
<tr><td>2.45-3.05 **S Langdon** A Boundary Integral Equation Method for High Frequency Acoustic Scattering in 3D</td><td>2.45-3.05 **SH Aydin, S Gümgüm & M Tezer-Sezgin** Dual Reciprocity Boundary Element Method Solution of Diffusion Equation</td></tr>
<tr><td>3.05-3.25 **B Carpentieri** High-Performance Iterative Solution of Large Dense Systems from Electromagnetics</td><td>3.05-3.25 **SE Mikhailov** Analysis of Boundary-Domain Integro-Differential Problems for some Elliptic BVPs with Variable Coefficients</td></tr>
<tr><td colspan="2">3.25-4.00 1L08 Tea</td></tr>
<tr><td>*WORKSHOP: High Frequency Methods* Chair: P Bettess
Madjeski Lecture Theatre</td><td>*BEM - FEM Coupling* Chair: JM Melenk
Nike Lecture Theatre</td></tr>
<tr><td>4.00-4.20 **S Sadov & M Kondratieva** An Approach to Robust High Frequency Boundary Integral Method via Symbol of DtN Operator</td><td>4.00-4.20 **V Domínguez & F-J Sayas** An Overlapped BEM-FEM Coupling for Solving a Transmission Problem</td></tr>
<tr><td>4.20-4.40 **J Tausch** A Spectral Method for Integral Formulations of Potential and High-Frequency Scattering Problems</td><td>4.20-4.40 **S Meddahi & V Selgas** A Mixed-FEM and BEM Coupling for a 3D Eddy Current Problem</td></tr>
<tr><td>4.40-5.00 **SN Chandler-Wilde & S Langdon** High Frequency Boundary Element Methods for Scattering by Polygons</td><td>4.40-5.00 **R Bustinza, G Gatica & F-J Sayas** Coupling BEM and LDG Methods</td></tr>
<tr><td colspan="2">5.00-5.30 Madjeski LT
Discussion Session on Future Research Directions in Boundary Integral Equation Methods. Chair: **IG Graham**</td></tr>
<tr><td colspan="2">7.00 Windsor Hall: Conference Dinner</td></tr>
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SATURDAY

<table>
<tr><td colspan="2">9.00-9.40 Madejski LT. Chair: M Bonnet
R Potthast An Introduction to Some New Methods for Inverse Scattering Problems</td></tr>
<tr><td>WORKSHOP: Inverse Problems Chair: M Bonnet
Madjeski Lecture Theatre</td><td>Elasticity Chair: S Langdon
Nike Lecture Theatre</td></tr>
<tr><td>9.45-10.05 L Marin & D Lesnic Boundary Element Regularization Methods for Solving the Cauchy Problem for the Helmholtz Equation</td><td>9.45-10.05 M Lim Boundary Layer Techniques for Deriving the Effective Properties of Composite Elastic Materials</td></tr>
<tr><td>10.05-10.25 CD Lines & SN Chandler-Wilde A Time Domain Point Source Method for Inverse Scattering by Rough Surfaces</td><td>10.05-10.25 TSA Ribeiro & G Beer On the Evaluation of Strongly Singular Domain Integrals in Elastoplasticity 2D</td></tr>
<tr><td colspan="2">10.25-11.00 1L08 Coffee</td></tr>
<tr><td colspan="2">11.00-11.40 Madjeski LT. Chair: SN Chandler-Wilde
W McLean The Conditioning of Boundary Element Equations</td></tr>
<tr><td colspan="2">11.45-12.25 Madjeski LT. Chair: SN Chandler-Wilde
M Bonnet & BB Guzina Topological Sensitivity for 3D Elastic and Acoustic Inverse Scattering</td></tr>
<tr><td colspan="2">12.25-1.30 1L08 Lunch</td></tr>
<tr><td colspan="2">1.30 End of Conference and Workshop</td></tr>
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