

W O N A P D E 2 0 2 4

SEVENTH CHILEAN WORKSHOP ON NUMERICAL
ANALYSIS OF PARTIAL DIFFERENTIAL EQUATIONS

PROGRAMME

Universidad de Concepción, Concepción, Chile, January 15–19

Last updated on 17th Jan, 2024 12:11 GMT-3

The conference **WONAPDE 2024** has been organized in: Plenary Lectures, Minisymposia, and a Session of Communications.

- Each Plenary Lecture lasts **50 minutes** including questions and comments.
- Each Contribution at a Minisymposium or the Session of Communications lasts **25 minutes** including questions and comments.
- The CONFERENCE SECRETARIAT is located in the entrance hall of the EMPREUDEC BUILDING.

The following notation is used to identify the places where the conference is carried on (see included campus map):

AUD-0	AUDITORIUM, FACULTAD DE INGENIERÍA BUILDING
AUD-1	AUDITORIUM JAIME BAEZA, EMPREUDEC BUILDING
AUD-2	AUDITORIUM, EMPRENDO BUILDING
AUD-3	AUDITORIUM, FACULTAD DE CIENCIAS FORESTALES BUILDING
AUD-4	AUDITORIUM, FACULTAD DE CIENCIAS VETERINARIAS BUILDING
AUD-5	AUDITORIUM, FACULTAD DE CIENCIAS SOCIALES BUILDING
AUD-6	AUDITORIUM DIMET, DEPARTAMENTO DE INGENIERÍA METALÚRGICA
WHITE TENT	TENT LOCATED IN THE PARKING LOT OF THE EMPREUDEC BUILDING

Please bear in mind that:

- You can **register** on Sunday 14, **15.00–19.00** and on Monday 15, **10.00–13.00** and **14.00–18.00**. Nevertheless, the CONFERENCE SECRETARIAT will also remain open during the rest of the week.
- All the Plenary Lectures will be held in **AUD-0**, except the Closing Plenary Lecture in **AUD-1**. In turn, all the Parallel Sessions will be held in **AUD-1, AUD-2, AUD-3, AUD-4, AUD-5** and **AUD-6**. Rest rooms can be found near each auditorium.
- The Welcome Reception and all the Coffee Breaks and Lunches will be held in the **WHITE TENT**. We **kindly request to wear the badges during these activities**.

GENERAL SCHEDULE OF THE MINISYMPOSIA

ORGANIZERS	Part I	Part II	Part III	Part IV	Part V
M. BOTTI, L. MASCOTTO	Tuesday: 11.20–13.00	Tuesday: 15.00–16.15	Wednesday: 11.20–13.00	Wednesday: 15.00–16.40	Thursday: 11.20–13.00
E. OTÁROLA, A. SALGADO	Tuesday: 15.00–16.15	Tuesday: 17.10–18.25			
C. COOPER, E. VAN 'T WOUT	Thursday: 15.00–16.40	Thursday: 17.10–18.00			
R. RODRÍGUEZ, P. SALGADO, P. VENEGAS	Tuesday: 15.00–16.40	Wednesday: 11.20–13.00	Wednesday: 15.00–16.15		
N. BARNAFI, S. SCACCHI	Tuesday: 11.20–12.35	Wednesday: 11.20–12.35			
T. FÜHRER, M. KARKULIK	Wednesday: 15.00–16.40	Wednesday: 17.10–18.50	Thursday: 11.20–13.00	Thursday: 15.00–16.40	Thursday: 17.10–18.25
E. CASTILLO, F. GALARCE	Tuesday: 17.10–18.50	Thursday: 11.20–12.35			
M. GSELL, E. KARABELAS, A. PETRAS	Thursday: 11.20–12.35	Thursday: 15.00–16.15			
I. MUGA, D. PARDO, P. SEPÚLVEDA	Tuesday: 11.20–12.35	Tuesday: 15.00–16.40	Wednesday: 11.20–13.00	Wednesday: 15.00–16.40	Friday: 11.20–13.00
E. CARLINI, A. FESTA, L. VILLADA	Tuesday: 17.10–18.25	Wednesday: 17.10–18.25	Thursday: 17.35–18.50		
F. LEPE, G. RIVERA, J. VELLOJÍN	Tuesday: 17.10–18.50	Wednesday: 17.10–18.50	Thursday: 11.20–12.35	Friday: 11.20–13.00	
R. OYARZÚA	Tuesday: 11.20–12.35	Wednesday: 17.10–18.50	Thursday: 17.10–18.50		
F. BETANCOURT, R. BÜRGER	Thursday: 11.20–13.00	Thursday: 15.00–16.40	Thursday: 17.10–17.35		
Y. SOBRAL	Thursday: 15.00–16.15	Friday: 11.20–12.35			
M. SÁNCHEZ, P. VEGA	Tuesday: 17.10–18.50	Wednesday: 17.10–18.25	Thursday: 15.00–16.40	Thursday: 17.10–18.50	Friday: 11.20–13.00
P. ESCAPIL-INCHAUSPÉ, J. PINTO	Thursday: 18.00–18.50	Friday: 11.20–12.35			
V. ANAYA	Thursday: 17.10–18.25				
J.-L. GUERMOND	Tuesday: 11.20–12.35	Tuesday: 15.00–16.15	Tuesday: 17.10–18.25	Wednesday: 11.20–13.00	Wednesday: 15.00–15.50
L. FORMAGGIA, A. FUMAGALLI, M. KUCHTA	Tuesday: 11.20–13.00				

THE CHAIRPERSONS OF MINISYMPOSIA SESSIONS WILL BE ASSIGNED BY THE RESPECTIVE ORGANIZERS

MONDAY, JANUARY 15 / MORNING

10.00–13.00 REGISTRATION [EMPREUDEEC BUILDING]

MONDAY, JANUARY 15 / AFTERNOON

14.00–18.00 REGISTRATION [EMPREUDEEC BUILDING]

18.15–19.20 OPENING CEREMONY [AUD-O]

18.15–18.30 WELCOME ADDRESS BY THE RECTOR

18.30–19.20 OPENING PLENARY LECTURE [Chairperson: G. GATICA]

Nilima Nigam: *On Skeletal Muscle: Modeling and Simulation.*

19.30–21.00 WELCOME RECEPTION [WHITE TENT]

TUESDAY, JANUARY 16

09.00–09.50 PLENARY LECTURE [AUD-0] [Chairperson: M. SOLANO]

Fioralba Cakoni: *Transmission Eigenvalues, Non-Scattering Phenomena and the Inverse Problem.*

09.55–10.45 PLENARY LECTURE [AUD-0] [Chairperson: M. SOLANO]

Sara Zahedi: *Divergence Preserving Cut Finite Element Methods.*

10.50–11.20 COFFEE BREAK [WHITE TENT]

TUESDAY: 11.20–11.45 | 11.45–12.10 | 12.10–12.35 | 12.35–13.00 PARALLEL SESSIONS

[AUD-1] Recent Advances in Polytopic Methods (Part I) [M. BOTTI, L. MASCOTTO]

L. BEIRÃO DA VEIGA,

G. VACCA: *A Deeper Investigation on Virtual Element Accuracy: The Role of Bulk and Boundary Approximations*

F. DASSI, D. MORA, C. REALES, I. VELÁSQUEZ: *Mixed Variational Formulations of Virtual Elements for the Polyharmonic Operator $(-\Delta)^n$*

D. ADAK, D. MORA, A. SILGADO: *A Nonconforming Stream Virtual Element Discretization for the Navier-Stokes Equations*

S. BERRONE, G. TEORA, F. VICINI: *Virtual Element Methods for Large-Scale Simulations in Complex Geometries: Polytopal Mesh Adaptivity*

[AUD-2] Theoretical and Numerical Advances for Mixed-Dimensional 3d-1d Coupling [L. FORMAGGIA, A. FUMAGALLI, M. KUČHTA]

B. CRIPPA, A. SCOTTI, A. VILLA: *Multiscale Modeling of Partial Discharges and Electrical Treeing*

A. FUMAGALLI, L. PANZERI, L. FORMAGGIA, A. SCOTTI, D. AROSIO: *a Mixed-Dimensional Model for Simulating Direct Current With a High-Resistivity Liner*

S. BERRONE, C. GIVERSO, D. GRAPPEIN, L. PREZIOSI, S. SCIALÒ: *An Optimization Based 3d-1d Coupling for Tissue Perfusion and Chemical Transport in Growing Capillary Networks*

B. TZOLOVA: *Coupled Flow and Transport in the Liver Organ*

[AUD-3] Neural Networks for Partial Differential Equations (Part I) [I. MUGA, D. PARDO, P. SEPÚLVEDA]

M. ACHONDO, C. COOPER, J. CHAUDHRY: *Solving the Poisson-Boltzmann Equation for Macromolecules in Polarizable Media Using (XPINN)s Extended Physics Informed Neural Networks*

B. ADCOCK, J. CARDENAS, N. DEXTER: *A General Framework for Active Learning in Regression, With Applications to Numerical PDEs*

B. ADCOCK, J. CARDENAS, A. DOOSTAN: *An Adaptive Sampling Strategy to Approximate Partial Differential Equations From Noisy Data*

[AUD-4] Structure Preserving Methods for Nonlinear Conservation Equations (Part I) [J.-L. GUERMOND]

R. ABGRALL, J. LIN, Y. LIU: *Active Flux for Triangular Meshes for Non Linear Hyperbolic Problems*

P. ANGUILL, P. CARGO, C. ÉNAUX, P. HOCH, E. LABOURASSE, G. SAMBA: *An Asymptotic Preserving Method for the Linear Transport Equation on General Meshes*

B. CHENTOUF, A. GUESMIA, M. SEPÚLVEDA, R. ASEM: *Boundary Stabilization of the Korteweg-De Vries-Burgers Equation With an Infinite Memory-Type Control and Applications: A Qualitative and Numerical Analysis*

[AUD-5] Effective Solvers for Innovative Discretizations of Multiphysics Phenomena (Part I) [N. BARNAFI, S. SCACCHI]

N. BARNAFI, N. HUYNH, L. PAVARINO, S. SCACCHI: *Scalable Preconditioned Newton-Krylov and Quasi-Newton Solvers for Nonlinear Cardiac Models*

D. BOFFI, F. CREDALI, L. GASTALDI, S. SCACCHI: *A Parallel Solver for Fluid-Structure Interaction Problems With Lagrange Multiplier*

P. BRUBECK, P. FARRELL: *Optimal Block Preconditioners for High-Order Discretizations of Multiphysics Problems in the De Rham Complex*

[AUD-6] Numerical Methods for Fluid-Membrane Interaction (Part I) [R. OYARZÚA]

A. KHAN, D. MORA, R. RUIZ-BAIER, J. VELLOJIN: *A Divergence-Free Finite Element Method for Flow-Transport Coupling With Osmotic Effects*

V. BURGOS, R. OYARZÚA, M. SOLANO: *A Mixed Finite Element Method for a Reverse Osmosis Model*

L. BAFFICO: *Numerical Approximation of a Fluid Flow in a Deformable Tube With Slip Boundary Condition of Friction Type on the Interface*

13.00–15.00 LUNCH [WHITE TENT]

TUESDAY: 15.00–15.25 | 15.25–15.50 | 15.50–16.15 | 16.15–16.40 PARALLEL SESSIONS

[AUD-1] **Recent Advances in Polytopic Methods (Part II)**
[M. BOTTI, L. MASCOTTO]

A. RUSSO: *Self-Stabilized Virtual Element Method*

A. BORIO, C. LOVADINA, F. MARCON, M. VISINONI: *A Lowest Order Stabilization-Free Mixed Virtual Element Method*

S. BERRONE, A. BORIO, F. MARCON, G. TEORA: *Stabilization-Free Virtual Element Methods in Primal Form*

[AUD-2] **Computational Electromagnetism (Part I)**
[R. RODRÍGUEZ, P. SALGADO, P. VENEGAS]

R. ACEVEDO, C. GÓMEZ, J. SAMBONÍ: *Existence and Uniqueness of Solution for a Family of Nonlinear Degenerate Mixed Parabolic Equations and Its Applications to Eddy Current Models*

V. HOJAS, C. ARANCIBIA, M. SÁNCHEZ: *Reflectionless Discrete PMLs for High-Order Finite Difference Schemes and Finite Element Methods*

P. ESCAPIL-INCHAUSPÉ, C. JEREZ-HANCKES: *Shape Uncertainty Quantification for Electromagnetic Wave Scattering via First-Order Sparse Boundary Element Approximation*

A. BERMÚDEZ, D. GÓMEZ, D. GONZÁLEZ: *Enhancing Operation and Design of Alternate Current-Powered Industrial Furnaces: Insights From Mathematical Modeling and Simulation*

[AUD-3] **Neural Networks for Partial Differential Equations (Part II)**
[I. MUGA, D. PARDO, P. SEPÚLVEDA]

C. ÁLVAREZ: *Deep Learning Methods for a Fluid Inverse Problem*

M. BASTIDAS, J. TAYLOR, D. PARDO: *Adaptive Deep Fourier Residual Method for Solving PDEs on Polygonal Domains*

M. BASTIDAS, I. MUGA, D. PARDO, J. TAYLOR: *The Deep Fourier Residual Method for PDEs: H^1 and $H(\text{curl})$ Test Spaces*

M. BASTIDAS, C. URIARTE, J. TAYLOR, S. ROJAS, D. PARDO: *Ultra-PINNs: Exploiting Ultraweak Implementations to Boost the Performance of Variational PINNs*

[AUD-4] **Structure Preserving Methods for Nonlinear Conservation Equations (Part II)**
[J.-L. GUERMOND]

W. BOSCHERI: *A Geometrically and Thermodynamically Compatible Finite Volume Scheme for Continuum Mechanics on Unstructured Voronoi Meshes*

S. DEL PINO, B. DESPRÉS, A. PLESSIER: *Implicit Discretization of Lagrangian Gas Dynamics*

L. DEL RÍO MARTÍN, F. DHAOUADI: *An Exactly Curl-Free Scheme for a Hyperbolic Model of Compressible Two-Fluid Flows*

[AUD-5] **Approximation and Analysis of Partial Differential Equations With Singular Data (Part I)**
[E. OTÁROLA, A. SALGADO]

I. MUGA, S. ROJAS, K. VAN DER ZEE, P. VEGA: *Source Regularization Through Projection in Dual Norms for Nonconforming Finite Element Discretizations*

J. BECK, Y. LIU, E. VON SCHWERIN, R. TEMPONE: *Goal-Oriented Adaptive Multilevel Quasi-Monte Carlo for Elliptic Random PDEs*

F. BERSETCHE, F. FUICA, E. OTÁROLA, D. QUERO: *Bilinear Optimal Control for the Fractional Laplacian: Error Estimates on Lipschitz Domains*

16.40–17.10 COFFEE BREAK [WHITE TENT]

TUESDAY: 17.10–17.35 | 17.35–18.00 | 18.00–18.25 | 18.25–18.50 PARALLEL SESSIONS

[AUD-1] Recent Advances in (Hybridizable) Discontinuous Galerkin Methods and Applications (Part I) [M. SÁNCHEZ, P. VEGA]

I. BERMÚDEZ, M. SOLANO, J. MANRÍQUEZ: *Discontinuous Galerkin Methods for Interface Problems*

M. BOTTI: *Functional Inequalities in Piecewise Sobolev Spaces and Applications to (Hybrid) Discontinuous Methods*

M. BOTTI, D. CASTAÑÓN QUIROZ, D. DI PIETRO, A. HARNIST: *Hybrid High-Order Methods for Incompressible Flows of Non-Newtonian Fluids*

A. STERN: *Multisymplectic Hybrid Finite Element Methods for Hamiltonian PDEs*

[AUD-2] Full and Reduced-Order Modeling of Multiphysics Problems (Part I) [E. CASTILLO, F. GALARCE]

J. AGUAYO, R. ARAYA: *A Priori Error Estimates for a Coseismic Slip Optimal Control Problem*

G. BARRENECHEA: *A Finite Element Method for the Navier-Stokes Equation With Free Surface*

R. CABRALES, E. CASTILLO, D. PACHECO: *Numerical Simulation of Phase Change Problems by Variational Multiscale Techniques*

A. CAIAZZO, C. CÁRCAMO, F. GALARCE, J. MURA: *Total Pressure-Based Frequency-Domain Formulation and Convergence Analysis of Biot's Poroelasticity Equations With a New Finite Element Stabilization*

[AUD-3] Numerical Approximation of Eigenvalue Problems of PDEs (Part I) [F. LEPE, G. RIVERA, J. VELLOJÍN]

J. ALMONACID, N. NIGAM: *Characterization of Singular Flows of Zeroth-Order Pseudo-Differential Operators via Elliptic Eigenfunctions*

D. AMIGO, F. LEPE, G. RIVERA: *A Virtual Element Method for the Elasticity Spectral Problem Allowing for Small Edges*

F. BERTRAND: *Least-Squares Finite Element Methods for Eigenvalue Problems*

D. BOFFI, F. GARDINI, G. MANZINI: *The Partition of Unity Finite Element Method for the Schrödinger Equation*

[AUD-4] Structure Preserving Methods for Nonlinear Conservation Equations (Part III) [J.-L. GUERMOND]

B. DESPRÉS: *Particle Dynamics With Shocks on Voronoi Meshes*

F. DHAOUADI, M. DUMBSER: *A Structure-Preserving Scheme for a Hyperbolic Approximation of the Navier-Stokes-Korteweg Equations*

T. DZANIC: *Continuously Bounds-Preserving Limiting Methods for High-Order Discontinuous Galerkin Schemes*

[AUD-5] Approximation and Analysis of Partial Differential Equations With Singular Data (Part II) [E. OTÁROLA, A. SALGADO]

F. FUICA, E. OTÁROLA: *A Pointwise Tracking Optimal Control Problem for the Stationary Navier-Stokes Equations*

T. NEUMEIER, M. PETER, D. PETERSEIM, D. WIEDEMANN: *Computational Polyconvexification of Isotropic Functions*

S. WALKER: *Curvature and the HHJ Method*

[AUD-6] Nonlinear Hyperbolic PDE: Numerical Techniques and Related Models (Part I) [E. CARLINI, A. FESTA, L. VILLADA]

R. BÜRGER, F. CHIARELLO, H. CONTRERAS, L. M. VILLADA: *Mathematical and Numerical Analysis of Conservation Laws With Continuous and Discontinuous Nonlocal Fluxes*

F. CAMILLI, A. FESTA: *A System of Hamilton-Jacobi Equations Characterizing Geodesic Centroidal Tessellations*

A. COHEN, M. LAURIERE, E. ZELL: *Deep Backward and Galerkin Methods for Learning Finite State Master Equations*

WEDNESDAY, JANUARY 17

09.00–09.50 PLENARY LECTURE [AUD-0]

[Chairperson: J. CAMAÑO]

Ilaria Perugia: *Nonconforming Virtual Element Methods.*

09.55–10.45 PLENARY LECTURE [AUD-0]

[Chairperson: J. CAMAÑO]

Abner J. Salgado: *Weights and Applications in Numerics.*

10.50–11.20 COFFEE BREAK [WHITE TENT]

WEDNESDAY: 11.20–11.45 | 11.45–12.10 | 12.10–12.35 | 12.35–13.00 PARALLEL SESSIONS

[AUD-1] **Recent Advances in Polytopic Methods (Part III)**
[M. BOTTI, L. MASCOTTO]

L. BEIRÃO DA VEIGA, C. CANUTO, R. NOCHETTO, G. VACCA, M. VERANI: *Adaptive Virtual Element Methods: Convergence and Optimality*

T. CHAUMONT-FRELET, J. GEDICKE, L. MASCOTTO: *Polynomial-Degree-Robust a Posteriori Estimates for the Virtual Element Method*

G. BARRENECHEA: *Positivity-Preserving Discretisations in General Meshes*

S. GÓMEZ: *High-Order Interpolatory/Quasi-Interpolatory Serendipity Virtual Element Method for Semilinear Parabolic Problems*

[AUD-2] **Computational Electromagnetism (Part II)**
[R. RODRÍGUEZ, P. SALGADO, P. VENEGAS]

L. ANGELO, J. CAMAÑO, S. CAU-CAO: *A Five-Field Mixed Formulation for Stationary Magneto-hydrodynamic Flows in Porous Media*

S. IMPÉRIALE, P. JOLY, J. RODRÍGUEZ: *On Time Stepping Schemes for the DG Discretisation of Friedrichs Systems. Part 1.*

S. IMPÉRIALE, P. JOLY, J. RODRÍGUEZ: *On Time Stepping Schemes for the DG Discretisation of Friedrichs Systems. Part 2.*

T. KANG, R. WANG, H. ZHANG: *Solvability Investigation on a Non-linear Magneto-Heat Coupling Axisymmetric Problem*

[AUD-3] **Neural Networks for Partial Differential Equations (Part III)**
[I. MUGA, D. PARDO, P. SEPÚLVEDA]

S. BERRONE, C. CANUTO, M. PINTORE, N. SUKUMAR: *Variational Physics Informed Neural Networks: The Role of Quadratures and Test Functions and Boundary Conditions*

F. BERSETCHE, J. BORTHAGARAY: *A Deep First-Order System Least Squares Methods for Solving Elliptic PDEs*

I. BREVIS, I. MUGA, K. VAN DER ZEE: *Neural Control of Finite Element Methods: Quasi-Optimal Convergence of Quasi-Minimizing Neural Networks*

T. BUI-THANH: *A Unified and Constructive Framework for the Universality of Neural Networks*

[AUD-4] **Structure Preserving Methods for Nonlinear Conservation Equations (Part IV)**
[J.-L. GUERMOND]

J.-L. GUERMOND, A. ERN: *Spectral Correctness of the Discontinuous Galerkin Approximation of the First-Order Form of Maxwell's Equations With Discontinuous Coefficients*

B. KEITH, T. SUROWIEC: *Proximal Galerkin: A Structure-Preserving Finite Element Method for Pointwise Bound Constraints*

T. KOLEV, R. RIEBEN, V. TOMOV, A. VARGAS: *Reduction of Material Diffusion in Multi-Material ALE Remap: Conservative and Bounded Matrix-Free Method*

M. MAIER, J. HOFFART, I. TOMAS: *Structure-Preserving Finite-Element Schemes for Coupled Euler-Poisson and Euler-Maxwell Systems*

[AUD-5] **Effective Solvers for Innovative Discretizations of Multiphysics Phenomena (Part II)**
[N. BARNAFI, S. SCACCHI]

F. CHEGINI, M. WEISER: *Efficient Domain Decomposition Preconditioners for Time Stepping in EMI Models*

I. FUMAGALLI, M. CORTI, N. PAROLINI, P. ANTONIETTI: *A Polytopal Discontinuous Galerkin Method for the Approximation of Brain Multiphysics Flow Dynamics*

N. BARNAFI: *Efficient Solvers in Nonlinear Poroelectricity*

13.00–13.10 OFFICIAL PHOTO [in front of the EMPREUDEEC BUILDING]

13.10–15.00 LUNCH [WHITE TENT]

WEDNESDAY: 15.00–15.25 | 15.25–15.50 | 15.50–16.15 | 16.15–16.40 PARALLEL SESSIONS

[AUD-1] **Recent Advances in Polytopic Methods (Part IV)**
[M. BOTTI, L. MASCOTTO]

T. BEVILACQUA, F. DASSI, S. ZAMPINI, S. SCACCHI: *Parallel Multilevel Preconditioners for Virtual Element Discretizations of Saddle Point Problems*

W. BOON, E. NILSSON: *Nodal Auxiliary Space Preconditioners for Mixed Virtual Element Methods*

S. KUMAR, D. MORA, R. RUIZ-BAIER, N. VERMA: *Virtual Element Approximations for the Poroelasticity/Elasticity Interface Problem on Polygonal Meshes*

G. MANZINI, D. ADAK, Y. LENG, J. PLOHR, H. MOURAD: *A C^1 -Conforming Arbitrary-Order Two-Dimensional Virtual Element Method for the Fourth-Order Phase-Field Equation*

[AUD-2] **Computational Electromagnetism (Part III)**
[R. RODRÍGUEZ, P. SALGADO, P. VENEGAS]

T. LÄHIVAARA, P. MONK: *The Ultra Weak Variational Formulation of Maxwell's Equations*

F. ORLANDINI, H. HERNÁNDEZ-FIGUEROA, P. DEVLOO: *Strongly Enforced Waveguide Port Boundary Condition and Its Application on the Analysis of Optical Devices*

M. PENA, P. MONK, V. SELGAS: *Numerical Simulation of Wave Propagation in a Waveguide Using Trefftz Elements*

[AUD-3] **Neural Networks for Partial Differential Equations (Part IV)**
[I. MUGA, D. PARDO, P. SEPÚLVEDA]

D. CAI: *Robust Adaptive Mesh Refinement and Energy-Driven Deep Distribution Transformers*

S. COBAISE, A. OSSES, F. ORTEGA-CULACIATI, P. ESCAPIL-INCHAUSPÉ: *Physics Informed Neural Network for Quasistatic Fault Slip Forward and Inverse Problems*

M. DUPREZ, E. FRANCK, F. LECOURTIER, V. LLERAS, A. LOZINSKI, V. VIGON, K. VUILLEMOT: *An Unfitted Method (Φ -Fem) Combined With Deep Learning: Variable Geometries and Correction*

F. HENRÍQUEZ, C. SCHWAB: *Wavenumber-Robust Deep ReLU Neural Network Emulation in Acoustic Wave Scattering*

[AUD-4] **Structure Preserving Methods for Nonlinear Conservation Equations (Part V)**
[J.-L. GUERMOND]

E. TOVAR: *A High-Order Explicit Runge-Kutta Approximation Technique for the Shallow Water Equations*

C. LIU, B. RIVIERE, J. SHEN, X. ZHANG: *A Simple and Efficient Convex Optimization Based Bound-Preserving High Order Accurate Limiter for Cahn–Hilliard–Navier–Stokes System*

[AUD-5] **From BEM to DPG: A Minisymposium Dedicated to the 60th Birthday of Prof. Norbert Heuer (Part I)**
[T. FÜHRER, M. KARKULIK]

D. BOFFI: *On the Finite Element Least Squares Approximation of Eigenvalue Problems*

J. BORTHAGARAY, R. NOCHETTO, A. SALGADO, C. TORRES: *Pointwise and Free Boundary Approximation of the Obstacle Problem for Nonlocal Operators*

L. CAMARGO, I. MUGA, S. ROJAS, P. VEGA: *Local Minimum-Residual a Posteriori Error Estimates for a Class of Mixed Finite Element Discretizations*

R. ARAYA, F. CHOULY: *Frictional Contact With Nitsche Method*

16.40–17.10 COFFEE BREAK [WHITE TENT]

WEDNESDAY: 17.10–17.35 | 17.35–18.00 | 18.00–18.25 | 18.25–18.50 PARALLEL SESSIONS

[AUD-1] **Recent Advances in (Hybridizable) Discontinuous Galerkin Methods and Applications (Part II)** [M. SÁNCHEZ, P. VEGA]

L. ZHAO, E.-J. PARK: *Hybrid Staggered Discontinuous Galerkin Method on General Meshes*

T. CHAUMONT-FRELET: *a Posteriori Error Estimates for IPDG Discretizations of Helmholtz Problems With Minimal Regularity*

J.-U. CHEN, HORVÁTH, T. BUI-THANH: *A Divergence-Conforming E-HDG Method for the Linearized Incompressible Resistive MHD Equations*

[AUD-2] **Numerical Methods for Fluid-Membrane Interaction (Part II)** [R. OYARZÚA]

J. CAMAÑO, R. OYARZÚA, M. SERÓN, M. SOLANO: *A Nonconforming Finite Element Method for a Nonisothermal Fluid-Membrane Interaction*

S. CAUCAO, R. OYARZÚA, S. VILLA-FUENTES: *Banach Space-Based Analysis of a Fully Mixed Formulation for the Navier-Stokes/Darcy Equations*

R. ARAYA, C. CÁRCAMO, A. POZA: *A Stabilized Finite Element Method for the Stokes-Temperature Coupled Problem*

G. GATICA, Z. GHARIBI, R. OYARZÚA: *Banach Spaces-Based Fully Mixed FEMs for the Boussinesq Problem With Temperature-Dependent Parameters*

[AUD-3] **Numerical Approximation of Eigenvalue Problems of PDEs (Part II)** [F. LEPE, G. RIVERA, J. VELLOJÍN]

D. BOFFI: *Model Order Reduction for Parametric Eigenvalue Problems*

D. BOFFI, A. KHAN: *Adaptive FEM for Stokes Eigenvalue Problems*

R. BUSTINZA, M. CICUTTIN, A. LOMBARDI: *An a Priori Error Analysis for a Steklov Eigenvalue Problem Using a Hybrid High-Order Method*

F. CAKONI: *Computation of Interior Eigenvalues From the Scattering Data*

[AUD-4] **Nonlinear Hyperbolic PDE: Numerical Techniques and Related Models (Part II)** [E. CARLINI, A. FESTA, L. VILLADA]

P. GOATIN: *Multi-Class and Multi-Population Traffic Flow Models on Networks*

P. GOATIN, L. M. VILLADA, D. INZUNZA: *High-Order Numerical Schemes for Nonlocal Macroscopic Models of Multi-Population Pedestrian Flows.*

D. GOMES: *Functional Analytic Insights Into Mean Field Game Theory*

[AUD-5] **From BEM to DPG: A Minisymposium Dedicated to the 60th Birthday of Prof. Norbert Heuer (Part II)** [T. FÜHRER, M. KARKULIK]

C. CARSTENSEN, T. FÜHRER, N. HEUER: *From DPG to Mixed FEM*

S. CAUCAO, G. GATICA, S. MEDRADO, Y. SOBRAL: *Nonlinear Twofold Saddle Point-Based Mixed Finite Element Methods for Granular Flows*

T. CHAUMONT-FRELET, G. GANTNER: *Adaptive Boundary Element Methods for Regularized Combined Field Integral Equations*

L. DEMKOWICZ, M. MELENK, S. HENNEKING, J. BADGER: *Full Envelope DPG Approximation for Electromagnetic Waveguides. Stability and Convergence Analysis.*

THURSDAY, JANUARY 18

09.00–09.50 PLENARY LECTURE [AUD-0] [Chairperson: R. BÜRGER]

Paola Goatin: *Non-Local Conservation Laws: Theory, Numerics and Applications.*

09.55–10.45 PLENARY LECTURE [AUD-0] [Chairperson: R. BÜRGER]

Stefan Diehl: *Applied Mathematics for Some Separation Processes.*

10.50–11.20 COFFEE BREAK [WHITE TENT]

THURSDAY: 11.20–11.45 | 11.45–12.10 | 12.10–12.35 | 12.35–13.00 PARALLEL SESSIONS

[AUD-1] Recent Advances in Polytopic Methods (Part V) [M. BOTTI, L. MASCOTTO]

D. CASTANON QUIROZ, D. DI PIETRO: *A Reynolds Semi-Robust and Pressure-Robust Hybrid High-Order Method for the Solution of the Incompressible Navier–Stokes Equations on General Meshes*

M. SÁNCHEZ, J. VALENZUELA: *Symplectic Hamiltonian Finite Element Methods for Semilinear Wave Propagation*

D. TAGAMI: *An Incomplete Balancing Domain Decomposition Method Based on Polynomial Finite Element Spaces*

L. ZHAO, E. CHUNG, E.-J. PARK: *A Locking-Free Polygonal Staggered DG Method for the Biot System of Poroelasticity*

[AUD-2] Full and Reduced-Order Modeling of Multiphysics Problems (Part II) [E. CASTILLO, F. GALARCE]

E. CASTILLO, R. REYES, C. BAYONA: *Reduced Order Modeling of Time-Dependent Purely Viscous Non-Newtonian Fluid Flows*

F. GALARCE: *Variational Strategies for Inverse Problems in Biomechanics*

F. HENRÍQUEZ, J. HESTHAVEN: *Model Order Reduction for Time-Dependent Problems Using the Laplace Transform*

[AUD-3] Mathematical Modelling in Biomedicine With Cardiac Applications (Part I) [M. GSELL, E. KARABELAS, A. PETRAS]

R. ARÓSTICA, D. NOLTE, C. BERTOGLIO: *Parameter Estimation in Cardiac Fluid–Structure Interaction From Solid and Fluid Data*

N. BARNAFI, A. PETRAS, L. GERARDO-GIORDA: *Cardiac Ablation as a Multi-Phase Thermoporoelastic Continuum Under Large Deformation*

E. KARABELAS, G. HAASE, F. CAFORIO: *CFD Simulations in Cardiovascular Systems*

[AUD-4] Numerical Approximation of Eigenvalue Problems of PDEs (Part III) [F. LEPE, G. RIVERA, J. VELLOJÍN]

E. CARLSON, F. FUENTES, D. GOLUSKIN: *Sum-of-Squares Polynomial Optimization to Study the Stability of Shear Flows*

F. FUENTES, W. IMBACHÍ: *Finite Element Solution of the Reynolds-Orr Energy Eigenvalue Problem*

L. GASTALDI: *Virtual Element Schemes for an Acoustic Vibration Problem*

[AUD-5] From BEM to DPG: A Minisymposium Dedicated to the 60th Birthday of Prof. Norbert Heuer (Part III) [T. FÜHRER, M. KARKULIK]

M. FEISCHL, H. HACKL: *Optimal Mesh Coarsening Under Constraints*

T. FÜHRER, F. FUICA: *A DPG Method for Linear Quadratic Optimal Control Problems*

T. FÜHRER, P. HERRERA, N. HEUER: *A DPG Method for the Quad-Curl Problem*

T. FÜHRER, N. HEUER: *Test Spaces and Fortin Operators for DPG*

[AUD-6] Numerical Methods for Mineral Processing, Wastewater Treatment, and Related Applications (Part I) [F. BETANCOURT, R. BÜRGER]

G. ALBUJA, A. ÁVILA, M. MURILLO: *Robust Superlinear Schemes Based on Adaptive Linearization for Solving Richards' Equation*

J. BARAJAS, R. BÜRGER, S. DIEHL, L. M. VILLADA: *Steady States of a Continuous Model Describing Countercurrent Decantation*

R. BÜRGER, S. DIEHL, M. C. MARTÍ, Y. VÁSQUEZ: *Froth Flotation With Drainage: Model and Steady-State Solutions Analysis*

R. BÜRGER, Y. MARTÍNEZ, L. M. VILLADA: *Front Tracking and Parameter Identification for a Conservation Law With a Space-Dependent Coefficient Modeling Granular Segregation*

13.00–15.00 LUNCH [WHITE TENT]

[AUD-1] Recent Advances in (Hybridizable) Discontinuous Galerkin Methods and Applications (Part III) [M. SÁNCHEZ, P. VEGA]

D. DEL REY FERNÁNDEZ, S. RHEBERGEN, P. ZÚÑIGA: *An Energy-Dissipative Diffusive-Interface Hybridizable Discontinuous Galerkin Method for Two-Phase Flows*
Z. DONG, L. MASCOTTO, O. SUTTON: *Residual-Based a Posteriori Error Estimates for an hp-Discontinuous Galerkin Method of the Biharmonic Problem*

S. GÓMEZ: *Structure-Preserving Local Discontinuous Galerkin Method for Nonlinear Cross-Diffusion System*

G. KANSCHAT, P. LU, A. RUPP: *Construction of Multigrid Solvers for Hybridized Discontinuous Galerkin Discretizations*

[AUD-2] Numerical Methods for Particulate and Non-Newtonian Flows (Part I) [Y. SOBRAL] S. GONZÁLEZ-ANDRADE, P. MÉNDEZ: *A Dual-Mixed Approximation for a Huber Regularization of Viscoplastic Flow Problems.*

G. YANG, L. JING, C. KWOK, Y. SOBRAL: *A Comprehensive Parametric Study of LBM-DEM for Immersed Granular Lows*
G. BUFOLO, Y. SOBRAL: *A Mollified Version of the Kuwabara-Kono Model for 2nd Order Convergence in DEM*

[AUD-3] Mathematical Modelling in Biomedicine With Cardiac Applications (Part II) [M. GSELL, E. KARABELAS, A. PETRAS]

A. PETRAS, M. LEONI, Z. WEIDMANN, J. GUERRA, L. GERARDO-GIORDA: *Accurate Cardiac Tissue Description in Computational Modeling of Radiofrequency Ablation*

J. RODRÍGUEZ PADILLA, B. LY, M. POP, M. SERMESANT: *On the Inducibility of Ventricular Tachycardia by Means of Different Stimulation Protocols: An Electrophysiology Simulation Study.*

J. MARTÍN TEMPESTTI, S. KIM, B. LINDSEY, A. VENEZIANI: *Comprehensive Evaluation of a Pseudo-Spectral Method for Wall Shear Stress Estimation in Cardiovascular Flows Under Varying Conditions*

[AUD-4] Boundary Integral Equations in Coupled Physical Systems (Part I) [C. COOPER, E. VAN 'T WOUT]

L. BANJAI, M. FERRARI: *Runge-Kutta Convolution Quadrature Based on Gauss Methods*

C. COOPER: *Bridging Boundaries in Molecular Electrostatics: Towards Leveraging BEM-based Tools Into Scientific Communities*

M. GUERRERO, C. COOPER: *Enhancing Predictive Accuracy in Molecular Electrostatics: Coupling Finite and Boundary Elements With Variable Permittivity*

F. HENRÍQUEZ, I. BIOLI, J. DÖLZ: *Parametric Shape Holomorphy of Boundary Integral Operators: Applications to Operator Learning and Multifidelity Bayesian Inversion*

[AUD-5] From BEM to DPG: A Minisymposium Dedicated to the 60th Birthday of Prof. Norbert Heuer (Part IV) [T. FÜHRER, M. KARKULIK]

T. FÜHRER, R. GONZÁLEZ, M. KARKULIK: *Space-Time Finite Elements for the Wave Equation*

C. GARCIA VERA: *A Time-Stepping DPG Scheme for the Timoshenko Beam Model.*

J. HASBANI, P. SEPÚLVEDA, I. MUGA, V. CALO, S. ROJAS: *A Residual Minimization Method Onto Bubble Enrichment*

N. HEUER, A. NIEMI: *Discontinuous Petrov-Galerkin Method for Arch Structures*

[AUD-6] Numerical Methods for Mineral Processing, Wastewater Treatment, and Related Applications (Part II) [F. BETANCOURT, R. BÜRGER]

R. BÜRGER, S. DIEHL, M. C. MARTÍ, Y. VÁSQUEZ: *Froth Flotation With Drainage: Numerical Method and Simulations.*

J. CAREAGA, G. GATICA: *Coupled Finite Volume and Mixed Finite Element Methods for the Viscous Model of Sedimentation*

S. DIEHL, J. MANRÍQUEZ, C. PAUL, T. ROSENQVIST: *A Mathematical-Ecological Model of Biofilm Growth In Slow Sand Filters*

J. MOYA: *Finite Volume Method in Tsunami Models and Coastal Forest Interaction*

16.40–17.10 COFFEE BREAK [WHITE TENT]

[AUD-1] Recent Advances in (Hybridizable) Discontinuous Galerkin Methods and Applications (Part IV) [M. SÁNCHEZ, P. VEGA]

G. CHEN, P. MONK, Y. ZHANG: *Analysis of an HDG Method for Maxwell's Equations Under Minimal Regularity*

T. KASHIWABARA, T. TSUCHIYA: *A Robust Discontinuous Galerkin Scheme on Anisotropic Meshes*

P. LEDERER, X. MOOSLECHNER, J. SCHÖBERL: *High-Order Projection-Based Upwind Method for Implicit Large Eddy Simulation*

C. NÚÑEZ, M. SÁNCHEZ: *Symplectic Hamiltonian Hybridizable Discontinuous Galerkin Methods for Linearized Shallow-Water Equations*

[AUD-2] Session of Communications [V. ANAYA]

D. ADAK: *Tensor Networks Space-Time Spectral Elements Method for Solving Heat Equation*

K. KOBAYASHI: *Error Estimation for the FEM Solution With a Few Bad Elements*

H. APABLAZA, R. VÉJAR ASEM: *A Finite Differences Scheme for a Camassa-Holm Type Equation.*

[AUD-3] Numerical Methods for Fluid-Membrane Interaction (Part III) [R. OYARZÚA]

S. CAUCAO, M. DISCACCIATI: *A Mixed FEM for the Coupled Brinkman–Forchheimer/Darcy Problem*

G. GATICA, C. INZUNZA, R. RUIZ-BAIER: *Fully Mixed Methods for the Coupled Poroelasticity and Poisson–Nernst–Planck Equations*

R. CARABALLO, C. IN, A. MARTÍN, R. RUIZ-BAIER: *Robust Finite Element Methods and Solvers for the Biot–Brinkman Equations in Vorticity Form*

A. POZA, R. REBOLLEDO: *Equal-Order Finite Element Method for the Stokes Equations With Variable Viscosity*

[AUD-4] Boundary Integral Equations in Coupled Physical Systems (Part II) [C. COOPER, E. VAN 'T WOUT]

D. HOONHOUT, R. LÖSCHER, O. STEINBACH, C. URZÚA-TORRES: *Stable Adaptive Least-Squares Space-Time BEM for the Wave Equation*

E. VAN 'T WOUT, R. HAQSHENAS, P. GÉLAT: *Boundary Element Methods for Focused Ultrasound Treatment in Biomedical Engineering*

[AUD-4] Recent Advances in BEM for Complex Domains (Part I) [P. ESCAPIL-INCHAUSPÉ, J. PINTO]

T. BETCKE, P. ESCAPIL-INCHAUSPÉ, C. JEREZ-HANCKES, M. SCROGGS: *Implementation of Local Multiple Traces Formulation for Electromagnetic Scattering by Complex Objects*

C. JEREZ-HANCKES, J. PINTO, T. YIN: *Spectral Galerkin Method for Solving Elastic Wave Scattering Problems With Multiple Open Arcs*

[AUD-5] From BEM to DPG: A Minisymposium Dedicated to the 60th Birthday of Prof. Norbert Heuer (Part V) [T. FÜHRER, M. KARKULIK]

T. LINSS, B. GIROL: *Resolving Singularities in Parabolic Initial-Boundary Value Problems*

I. MUGA, S. ROJAS, K. VAN DER ZEE, P. VEGA: *Adaptive Projections in Dual Norms: An Overview of the State of the Art*

A. SOENJAYA, T. TRAN: *Numerical Analysis of the Landau–Lifshitz–Baryakhtar Equation in Micromagnetics*

[AUD-6] Numerical Methods for Mineral Processing, Wastewater Treatment, and Related Applications (Part III) [F. BETANCOURT, R. BÜRGER]

P. MULET: *Implicit-Explicit Schemes for the Compressible Cahn–Hilliard–Navier–Stokes Equations*

[AUD-6] Nonlinear Hyperbolic PDE: Numerical Techniques and Related Models (Part III) [E. CARLINI, A. FESTA, L. VILLADA]

G. MONTECINOS, E. TORO: *the ENO-ET Spatial Reconstruction Scheme: Advances in Non-Linear High-Order Numerical Schemes*

M. SEPÚLVEDA, N. TORRES, L. M. VILLADA: *Well-Posedness and Numerical Analysis of an Elapsed Time Model With Strongly Coupled Neural Networks*

G. V. GOWDA, N. MANOJ, S. KUMAR K.: *On the Convergence of a Second-Order Scheme for Non-Local Conservation Laws*

THURSDAY, JANUARY 18 / EVENING

20.15 CONFERENCE DINNER
[B I O P A R K]

*At 19.00 hrs. there will be buses waiting in front of the EMPREUDEC BUILDING. They will leave to **Biopark** at 19.30 hrs.*

Please, notice that:

- *those people **not planning to attend,***
- *those people **planning to attend that are vegetarians,***
- *and the **accompanying persons who also plan to attend,***

should let us know at the Conference Secretariat no later than **Monday, January 15.**

FRIDAY, JANUARY 19

09.00–09.50 PLENARY LECTURE [AUD-0]

[Chairperson: S. CAUCAO]

Vanja Nikolić: *Mathematical Ultrasonics: Analysis and Simulation.*

09.55–10.45 PLENARY LECTURE [AUD-0]

[Chairperson: S. CAUCAO]

Ivan Yotov: *Mixed Finite Element Methods for Fluid-Poroelastic Structure Interaction.*

10.50–11.20 COFFEE BREAK [WHITE TENT]

FRIDAY: 11.20–11.45 | 11.45–12.10 | 12.10–12.35 | 12.35–13.00 PARALLEL SESSIONS

[AUD-1] **Recent Advances in (Hybridizable) Discontinuous Galerkin Methods and Applications (Part V)** [M. SÁNCHEZ, P. VEGA]

S. PESCUA, T. CHAUMONT-FRELET, G. GABARD, A. MODAVE: *HDG Methods With Transmission Variables for Helmholtz Problems*

A. RUPP, M. GAHN, G. KANSCHAT: *Hybrid Discontinuous Galerkin Methods for PDEs on Hypergraphs and Networks of Surfaces*

L. CAMARGO, S. ROJAS, P. VEGA: *An Adaptive Residual Minimization Method Based on HDG Formulations in Primal Form*

L. CAMARGO, S. ROJAS, P. VEGA: *Minimum-Residual a Posteriori Error Estimates for a Hybridizable Discontinuous Galerkin Discretization of the Helmholtz Equation*

[AUD-2] **Numerical Methods for Particulate and Non-Newtonian Flows (Part II)** [Y. SOBRAL]

M. DUPREZ, V. LLERAS, A. LOZINSKI: *ϕ -Fem: An Optimally Convergent and Easily Implementable Immersed Boundary Method for Particulate Flows and Stokes Equations*

S. MEDRADO, YURI SOBRAL: *A Numerical Solution for the Saturated Wave Regime in Fluidised Beds*

G. DA ROCHA, P. PAZ, YURI SOBRAL: *Plateau-Rayleigh Instability in Superparamagnetic Ferrofluids: A Simplified 1D Theory*

[AUD-3] **Neural Networks for Partial Differential Equations (Part V)** [I. MUGA, D. PARDO, P. SEPÚLVEDA]

A. MAGUERESSE, S. BADIA: *Adaptive Quadratures for Nonlinear Approximation of Low-Dimensional PDEs Using Smooth Neural Networks*

C. MOLINA CATRICHEO, F. LAMBERT, J. SALOMON, E. VAN 'T WOUT: *Modeling Global Surface Dust Deposition Using Physics-Informed Neural Networks*

S. MORAGA, B. ADCOCK, S. BRUGIAPAGLIA, N. DEXTER: *Near-Optimal Learning of Banach-Valued, High-Dimensional Functions via Deep Neural Networks for Parametric PDEs*

Z. ALDIRANY, R. COTTEREAU, M. LAFOREST, S. PRUDHOMME: *Multi-Level Neural Networks for Accurate Solutions of Boundary-Value Problems*

[AUD-4] **Numerical Approximation of Eigenvalue Problems of PDEs (Part IV)** [F. LEPE, G. RIVERA, J. VELLOJÍN]

F. LEPE, D. MORA, G. RIVERA, I. VELÁSQUEZ: *A Posteriori Virtual Element Method for the Acoustic Vibration Problem*

F. LEPE, G. RIVERA: *VEM Allowing Small Edges for the Reaction-Convection-Diffusion Equation: Source and Eigenvalue Problems*

F. LEPE, G. RIVERA, J. VELLOJIN: *Finite Element Analysis of the Oseen Eigenvalue Problem*

Ö. TÜRK: *Approximation of a Laplace-Steklov Eigenvalue Problem by Finite and Boundary Element Methods*

[AUD-6] **Recent Advances in BEM for Complex Domains (Part II)** [P. ESCAPIL-INCHAUSPÉ, J. PINTO]

I. LABARCA, R. HIPTMAIR: *Coupled Volume and Boundary Integral Equations for Electromagnetic Scattering*

J. PINTO, I. MARTINEZ: *Quasi-Periodic Boundary Integral Model of Nerve Electrical Stimulation*

P. ESCAPIL-INCHAUSPÉ, M. GODOY DÍAZ, C. JEREZHANCKES, C. COOPER: *Quantifying Atomic Position Uncertainty in Molecular Electrostatics With Poisson-Boltzmann and Boundary Elements*

13.00–15.00 LUNCH [WHITE TENT]

15.10–16.00 CLOSING PLENARY LECTURE [AUD-1] [Chairperson: R. OYARZÚA]
Ricardo Ruiz-Baier: *Numerical Analysis of a Porous Natural Convection System With Vorticity and Viscous Dissipation.*

16.00–16.30 COFFEE BREAK [WHITE TENT]

CAMPUS MAP

