

Programme



TUESDAY 01 NOVEMBER 2022. 17:00 – 19:00: Registration and Welcome Function, GSB (V&A Waterfront)			
WEDNESDAY 02 NOVEMBER 2022			
Session	Venue A	Venue B	Venue C
1 (09:00 -10:00)	Conference Opening & KEYNOTE LECTURE		
Tea Break (10:00 – 10:30)			
2 (10:30 - 12:30)	Numerical Simulation Methods I	Inverse Problems, Optimization and Design	Models for Computational Analyses of Cardiovascular Biomechanics I
Lunch (12:30 -13:30)			
3 (13:30 – 15:00)	Numerical methods for partial differential equations I	Material Design and Modelling	Models for Computational Analyses of Cardiovascular Biomechanics II
Tea break (15:00 – 15:30)			
4 (15:30 – 16:30)	Numerical methods for partial differential equations II	Damage, Fracture and Failure	Models for Computational Analyses of Cardiovascular Biomechanics III
THURSDAY 03 NOVEMBER 2022			
5 (8:30 - 10:00)	KEYNOTE LECTURES		
Tea break (10:00 – 10:30)			
6 (10:30 - 12:30)	Numerical Simulation Methods II	Extended Continua: Computational Challenges I	Structural Mechanics, Stability and Dynamics I
Lunch (12:30 -13:30)			
7 (13:30 - 15:00)	Numerical methods for partial differential equations III	Extended Continua: Computational Challenges II	Models for Computational Analyses of Cardiovascular Biomechanics IV
Tea break (15:00 – 15:30)			
8 (15:30 - 16:30)	Flow Problems I	Model Reduction & Visualization	Advanced Strategies for Numerical Simulations in the Presence of Polymorphic Uncertain Data
Conference Dinner 19:00			
FRIDAY 04 NOVEMBER 2022			
9 (8:30 – 10:00)	KEYNOTE LECTURES		
Tea break (10:00 – 10:30)			
10 (10:30 - 12:30)	Flow Problems II	Biological systems	Structural Mechanics, Stability and Dynamics II
Lunch (12:30 -13:30)			
11 (13:30 - 15:00)	Data Science and Machine Learning	Multi-scale and Multi-physics Problems	
Closing Function 15:00 – 16:00			

WEDNESDAY 02 NOVEMBER 2022

Session 1 (09:00 -10:00) (Venue A)		
Conference Opening: <i>Sebastian Skatulla</i>		
KEYNOTE LECTURE [Chair: Sebastian Skatulla]		
Hierarchical Deep Learning Neural Network (HiDeNN)-AI for process design and performance prediction of material systems <i>Wing Kam Liu</i>		
Tea Break (10:00 – 10:30)		
Session 2 (10:30 – 12:30) [Chairs: Andie de Villiers (A), Malebogo Ngoepe (B), Michele Marino (C)]		
Numerical Simulation Methods I	Inverse Problems, Optimization and Design	Models for Computational Analyses of Cardiovascular Biomechanics I
<p>Area of the intersection between a sphere and a cylindrical plane <i>CG du Toit</i></p> <p>Using the Material Point Method (MPM) to model bulk materials <i>Corne Coetzee; Matt Purvance</i></p> <p>Discrete Element Method (DEM) calibration of cohesive bulk materials <i>Corne Coetzee; Otto Scheffler</i></p> <p>A meshless general finite difference scheme for incompressible multiphase flow <i>Johannes C. Joubert</i></p> <p>The effect of media shape, size and material, and mill size on relative strengths of grinding mechanisms <i>Sandile Nkwanyana, Indresan Govender</i></p> <p>Two-way coupled DEM/SPH modelling of particulate and fluid flow in laboratory scale vertical stirred media detritors <i>Divine Ssebunnya; Aubrey Mainza; Stephen Neethling</i></p>	<p>Application of a novel method for characterising the Mooney Rivlin material model <i>John D. Van Tonder; Gerhard Venter; Martin P. Venter</i></p> <p>A procedure for the development of environment-specific behaviour in fluid actuated soft robots using reduced-order models within a hierarchical design approach. <i>Martin Philip Venter; Philip Frederik Ligthart</i></p> <p>Gradient enhanced space-time surrogate models for the optimisation of snap-through behaviour in complaint mechanisms <i>Johann Bouwer; Nico Wilke; Schalk Kok</i></p> <p>The parameter identifiability problem: Why it is important and solution strategies <i>Daniel N. Wilke</i></p> <p>Suitability study of independent component analysis to obtain interpretable latent components from guided wave ultrasonic spectrogram data <i>Isaac Setshedi; Nico Wilke; Philip Loveday</i></p> <p>Generative design using Lindenmayer-Systems, and reduced models <i>Martin Venter; Izak Joubert</i></p>	<p>Model-based assessment of passive material parameters in rheumatic heart disease patients and healthy subjects <i>Mary A. Familusi; Sebastian Skatulla; Olukayode O. Aremu; Ntobeko AB. Ntusi; Freedom N. Gumedze; Jagir R. Hussan</i></p> <p>Mechanical pacing of myocardial tissue in a simplified computational model <i>Dennis Ogiermann; Daniel Balzani; Luigi E. Perotti</i></p> <p>Right ventricular mechanics in early-stage pulmonary arterial hypertension: a computational study <i>Oscar Odeigah; Daniela Valdez-Jasso; Joakim Sundnes</i></p> <p>Sensitivity study of patient specific coarctation of the Aorta Machine Learning Computational Fluid Dynamics Study using Doppler Echocardiography and CT Angiography <i>Vincent Milimo Masilokwa Punabantu; Malebogo Ngoepe; Amit Kumar Mishra</i></p> <p>Evaluation of physics-informed neural network solution accuracy and efficiency for modelling aortic transvalvular blood flow <i>Ryno Laubscher; Jacques Du Toit</i></p> <p>Development of a patient-specific design methodology for aortic valve cost-effective mechanical surrogates <i>Eugene Marais; Prof. Martin Venter; Ryno Laubscher</i></p>
Lunch (12:30 -13:30)		

Session 3 (13:30 -15:00) [Chairs: Daniele Boffi (A), Reuben Govender (B), Tim Ricken (C)]		
Numerical methods for partial differential equations I	Material Design and Modelling	Models for Computational Analyses of Cardiovascular Biomechanics II
<p>Space–time virtual elements for the heat equation <i>Sergio Gómez; Lorenzo Mascotto; Andrea Moiola; Ilaria Perugia</i></p> <p>Mixed formulations for poroelasticity/free-flow using total pressure <i>Ricardo Ruiz Baier</i></p> <p>A Lagrange multiplier formulation for the finite element discretization of FSI <i>Lucia Gastaldi</i></p> <p>Discrete de Rham complexes of differential forms on polytopal meshes <i>Francesco Bonaldi; Daniele A. Di Pietro</i></p>	<p>Some aspects of a continuum sintering model formulated in the standard dissipative framework <i>Sebastian Stark</i></p> <p>A numerical framework to model nonlinearity in hyper elastic truss-based metamaterials <i>Helen Le Clézio; Claire Lestringant; Dennis M. Kochmann</i></p> <p>A finite element approach to the modelling of strain-induced crystallisation of polymers using a multiple natural configuration framework <i>Ernesto Ismail; Daya Reddy</i></p> <p>A software pipeline for modelling microstructure evolution of aluminium alloys with a focus on the effect of intermetallic particles <i>Benjamin Alheit; Oyindamola Kayode; Ernesto Ismail; Sarah George</i></p>	<p>Agent based growth model for rat aorta and porcine aorta <i>Hampwaye Nasonkwe; Ngoepe Malebogo</i></p> <p>A 1D model of the maternal hemodynamics and vascular growth and remodelling in early- and late-preeclampsia <i>Rudolph L. Gleason, Jr.; Farbod Sedaghati; Julia L Woodall</i></p> <p>Multiscale chemo-mechano-biological modelling of the cardiovascular system for hypertension-related arterial remodelling <i>Bastien Sauty; Giuseppe Vairo; Michele Marino</i></p> <p>Modelling the calcium-dependent and -independent pathway of the active response in arterial walls <i>Daniel Balzani; Klemens Uhlmann</i></p>
Tea Break (15:00 – 15:30)		
Session 4 (15:30 – 17:00) [Chairs: Lucia Gastaldi (A), Corne Coetzee (B), tba (C)]		
Numerical methods for partial differential equations II	Damage, Fracture and Failure	Models for Computational Analyses of Cardiovascular Biomechanics III
<p>Efficient nonlinear solvers and domain decomposition preconditioners for cardiac reaction-diffusion equations <i>Ngoc Mai Monica Huynh</i></p> <p>Adaptive mesh refinement procedures for the virtual element method <i>Daniel van Huyssteen; Felipe Lopez Rivarola; Guillermo Etse; Paul Steinmann</i></p> <p>A-priori and a-posteriori analysis of mixed finite elements with piecewise constant Lagrange multiplier for fictitious domain problems with distributed Lagrange multiplier <i>Najwa Alshehri; Daniele Boffi; Lucia Gastaldi</i></p> <p>Robust preconditioners for multi-physics problems <i>Kent-Andre Mardal</i></p>	<p>3D modelling of fatigue damage in granitic rock by piezoelectric effect in quartz phase due to alternating current excitation <i>Timo Saksala</i></p> <p>Efficient simulation of ductile crack propagation at finite strains through metal matrix composites based on the Finite Cell Method and Eigeneration <i>Dennis Wingender; Daniel Balzani</i></p> <p>Numerical studies to categorize metal loss flaws on boiler tubes <i>Ifeanyi E. Kalu; Schalk Kok; Helen M. Inglis</i></p> <p>Natural fragmentation of a steel casing <i>Dieketseng Suna Kotole; Conrad Mahlase</i></p>	<p>Finite element analysis of bending stiffness of a bi-axial braided stent during carotid artery deployment <i>Jerry Ochola; Michele Conti</i></p> <p>Numerical modelling of electrospun grafts under cyclic loading for cardiovascular applications <i>Jerry Ochola; Deon Bezuidenhout; Thomas Franz</i></p> <p>Inference of pulmonary hypertension indicators using non-invasive measurements and scientific machine learning techniques <i>Ryno Laubscher; Johan Van Der Merwer; Philip Herbst; Jacques Liebenberg</i></p> <p>Modelling and simulation of cardiac radiofrequency ablation including fluid-structure interaction and contact mechanics <i>Massimiliano Leoni; Argyrios Petras; Luca Gerardo-Giorda; Jose Guerra</i></p>

THURSDAY 03 NOVEMBER 2022

Session 5 (8:30 -10:00) KEYNOTE LECTURES [Chair: Daya Reddy]		
Provably Energy Stable Approximations of Linear and Nonlinear Hyperbolic Problems <i>Jan Nordström</i>		
Peridynamic modeling of ductile and quasi-brittle fracture <i>John T. Foster</i>		
Tea Break (10:00 – 10:30)		
Session 6 (10:30 – 12:30) [Chairs: CG du Toit (A), Andrew McBride/Paul Steinmann (B), Daniel Wilke (C)]		
Numerical Simulation Methods II	Extended Continua: Computational Challenges I	Structural Mechanics, Stability and Dynamics I
Numerical analysis of the impact of heat exchangers geometry on the performance of thermo-acoustic systems <i>Accordance Ntimane; Lagouge Tartibu</i>	Continuum-kinematics-inspired peridynamics: from kinematics via balances to computations <i>Paul Steinmann; Ali Javili; Andrew McBride</i>	FreeCAD's Nikra-DAP – a planar multibody analysis workbench for analyzing rigid body mechanisms that move in a plane <i>Lukas J du Plessis</i>
A PEPT validation study of DEM-modelled shaped particle motion inside a tumbling mill ball charge <i>M. C. Richter; A. N. Mainza; Indresan Govender; Imran Parker</i>	Aspects of material modeling in continuum-kinematics-inspired peridynamics <i>Ekim Ekiz; Paul Steinmann; Ali Javili</i>	Experimental and numerical investigation of the in-plane compression of corrugated paperboard panels <i>Johan Cillie; Corné Coetzee</i>
A generative design process for 2D soft robot actuators <i>Martin Venter; Naude Conradie</i>	A continuum-kinematics-inspired visco-elastic peridynamic model <i>Andie de Villiers; Ali Javili</i>	Coupled DEM-FEM approach for rockfall protection structures <i>K. B. Sautter; K.-U. Bletzinger; R. Wüchner</i>
Validation of a cohesive material's DEM calibration process <i>Otto Scheffler; Corné Coetzee</i>	Continuum-kinematics-inspired peridynamics: elasto-plasticity <i>Andrew McBride; Ali Javili; Julia Mergheim; Paul Steinmann</i>	Theoretical and Experimental Analysis of Gear Transmission Error to Enhance Fault Diagnosis <i>Sigonde Vhahangwele Colleen</i>
An analysis of numerical homogenization methods applied on corrugated paperboard <i>Rhoda Ngira Aduke; Corne Coetzee; Martin Philip Venter</i>	Atomistic-inspired peridynamics <i>Ali Javili; Ekim Ekiz; Andrew McBride; Paul Steinmann</i>	Wave propagation in spatially-variant architected truss lattices <i>Bastian Telgen; Vignesh Kannan; Charles J. Dorn; Dennis M. Kochmann</i>
Data-driven physics-based digital twin model to predict GWU inspection signals in welded rails subject to varying EOC conditions <i>Dineo A. Ramatlo; Daniel N. Wilke; Philip W. Loveday</i>		Dynamic cracked cardan shaft detection in a viscous fluid medium based on RPM-frequency and synchronized wavelet transform techniques <i>Bernard Xavier Tchomeni Kouejou; Alfayo Anyika Alugongo</i>
Lunch (12:30 -13:30)		

Session 7 (13:30 -15:00) [Chairs: Daniele Boffi (A), Andrew McBride/Paul Steinmann (B), tba (C)]		
Numerical methods for partial differential equations III	Extended Continua: Computational Challenges II	Models for Computational Analyses of Cardiovascular Biomechanics IV
<p>Convergent structure-preserving finite element methods for nematic liquid crystals <i>Michele Ruggeri</i></p> <p>Finite-differences scheme and multigrid method for a tensor PDE model of biological network formation <i>Clarissa Astuto; Daniele Boffi; Jan Haskovec; Peter Markowich; Giovanni Russo</i></p> <p>A parallel solver for FSI problems with fictitious domain approach <i>Daniele Boffi; Fabio Credali; Lucia Gastadi; Simone Scacchi</i></p> <p>Finite Neuron Method for Numerical PDEs <i>Jinchao Xu</i></p>	<p>Quasicontinuum coarsegraining for the discrete element method <i>David de Klerk; Tom Shire; Zhiwei Gao; Andrew McBride; Paul Steinmann; Chris Pearce</i></p> <p>Computational continuum modelling of cell aggregation phenomenon <i>Soheil Firooz; Vasily Zaburdaev; Paul Steinmann; Ali Javili</i></p> <p>The role of compressibility on the Plateau-Rayleigh instability of soft compressible solids <i>A Derya Bakiler; Ali Javili; Berkin Dortdivanlioglu</i></p>	<p>CFD modelling of an aortic narrowing: towards a multi-fidelity predictive capability <i>Jie Wang</i></p> <p>Evaluating inlet disturbance effects on haemodynamics in a patient-specific aorta <i>Emily Manchester; Alex Skillen; Alistair Revell</i></p> <p>Development of a computational model of thrombosis in COVID-19 <i>Qudus Jimoh-Taiwo; Weihua Ho; Malebogo Ngoepe</i></p> <p>Multiscale and multiphase simulation of function-perfusion processes in the human liver <i>Tim Ricken; Steffen Gerhäuser; Lena Lambers; Luis Mandl</i></p>
Tea Break (15:00 – 15:30)		
Session 8 (15:30 – 17:00) [Chairs: Muaaz Bhamjee (A), Peter Wriggers (B), Michael Kaliske (C)]		
Flow Problems I	Model Reduction & Visualization	Advanced Strategies for Numerical Simulations in the Presence of Polymorphic Uncertain Data
<p>Experimental validation of the linearised $\mu(i)$-rheology applied to rotating drum flows spanning rolling-to-fully cascading flows <i>Indresan Govender; Taswald Llewelyn Moodley; Maximilian Richter; David de Klerk</i></p> <p>Coarse-grained granular flow analysis of tumbling mills using validated DEM data <i>Taswald Llewelyn Moodley; Indresan Govender</i></p> <p>The use of computational fluid dynamics for assessing flow-induced acoustics to diagnose lung conditions <i>Khanyisani M. Makhanya; Muaaz Bhamjee; Neil A. Martinson</i></p> <p>A novel efficient approach for computational fluid dynamics meets advanced modeling in biomechanics <i>Wolfgang A. Wall</i></p>	<p>Some benefits of sensitivities and gradients in developing digital twin surrogates <i>Daniel N. Wilke</i></p> <p>Proposing a method for the compensation of out-of-plane motions in 2D digital image correlation data <i>Carl-Hein Visser; Gerhard Venter; Melody Neaves</i></p> <p>Inducing visual dominance with binocular rivalry in a virtual reality head-mounted display <i>Julianne Blignaut; Ivan Crookart; Martin Venter; David van den Heever; Mark Solms</i></p>	<p>Optimization of locally laser-hardened car components with respect to reliability in presence of polymorphic uncertainties <i>Niklas Miska; Daniel Balzani</i></p> <p>From timber to reinforced concrete – advances in structural analysis with polymorphic uncertain parameters <i>Michael Kaliske; F. Niklas Schietzold; Selina Zschocke; Ferenc Leichsenring; Wolfgang Graf</i></p> <p>Shifted interval method – an efficient approach to solve constrained optimization problems considering epistemic uncertainty <i>Philipp Edler; Steffen Freitag; Günther Meschke</i></p>
Conference dinner 19:00: GOLD Restaurant, Green Point		

FRIDAY 04 NOVEMBER 2022

Session 9 (8:30 -10:00) KEYNOTE LECTURES [Chair: Georges Limbert]		
Application of virtual elements for simulations in solid mechanics <i>Peter Wriggers</i>		
Some perspectives on strain-gradient plasticity <i>Daya Reddy</i>		
Tea Break (10:00 – 10:30)		
Session 10 (10:30 – 12:30) [Chairs: Indresan Govender (A), Ricardo Ruiz Baier (B), <i>Ernesto Ismail</i> (C)]		
Flow Problems II	Biological systems	Structural Mechanics, Stability and Dynamics II
Image frequency analysis of multiphase interfaces to quantify primary atomization <i>Johannes C. Joubert</i>	Bone remodelling: multiple stimuli and scales <i>Areti Papastavrou; Ina Schmidt; Paul Steinmann</i>	Simple oscillating model steam engine – investigating the effect of using different diameter bronze pistons inside a cast iron cylinder <i>Lukas J du Plessis</i>
Numerical modelling of cavitation rates and noise acoustics of marine propellers <i>Kwanda Mercury Dlamini</i>	Continuum bone remodelling considering mechanical stimulation and epiphyseal bone healing <i>Ina Schmidt; Paul Steinmann; Areti Papastavrou</i>	Fault diagnosis of a cardan shaft operating under steady and harsh environmental conditions using RPM-frequency techniques <i>Bernard Xavier Tchomeni Kouejou; Alfayo Anyika Alugongo</i>
Numerical analysis on the effect of the vortex finder on the hydrocyclone’s split water ratio and separation performance <i>Vuyo Hashe</i>	Patient specific automated generative methods for a single finger, coupling non-linear soft actuator structural behaviour to a kinematic finger model <i>Sung bok Chung; Martin Philip Venter</i>	Experimental study of coupled torsional and lateral vibration of vertical rotor-to-stator contact in a fluid <i>Desejo Filipeson Sozinando; Xavier Tchomeni Kouejou; Alfayo Anyika Alugongo</i>
Numerical study of topology effects on the wind loading of ground mounted photovoltaic arrays <i>Nikhil Mehta; Johann Richard Bredell</i>	Outcome comparison between computational model of thrombosis in cerebral aneurysms and In Vitro PIV Thrombosis Model <i>Struan Hume; Malebogo Ngoepe; Wei Hua Ho</i>	Experimental study and comparative analysis of pitching fault on a single-stage spur gear system <i>Yakeu Happi Kemajou Herbert; Bernard Xavier Tchomeni; Alfayo Anyika Alugongo</i>
The modification of the dynamic behaviour of the cyclonic flow in a hydrocyclone under surging conditions <i>Muaaz Bhamjee; Simon H Connel; Andre L. Nel</i>	Recent advances in skin biomechanics and mechanobiology – convergence of physical experiments, imaging and modelling techniques <i>Reuben Govender</i>	Nanofiber polymers for coating titanium-based biomedical implants <i>Nthabiseng Nhlapo</i>
	Preliminary biological analyses of additively manufactured Ti6Al4V alloy: merging mechanics and biology <i>Nthabiseng Nhlapo</i>	Numerical study on the mechanical analysis of functionally graded plates <i>Ana M. A. Neves</i>
Lunch (12:30 -13:30)		

Session 11 (13:30 -15:15) [Chairs: Ben Alheit (A), Sebastian Stark (B)]		
Data Science and Machine Learning	Multi-scale and Multi-physics Problems	
<p>Estimating treatment effects in observational studies by predicting counterfactuals <i>Bevan I. Smith; Charles Chimedza; Jacoba H. Buhrmann</i></p> <p>Considering physical restrictions in the training process of feedforward neural networks for modelling rate-independent plasticity <i>Patrick Weber; Werner Wagner; Steffen Freitag</i></p> <p>Statistical shape analysis of 3D women body throughout gestation: toward a novel, low-cost, accurate framework for risk assessment of cephalopelvic disproportion <i>Minliang Liu; Likhit Nayak; Mahlet Yigeremu; Sisay Teklu; Rudolph L Gleason</i></p> <p>A PINN surrogate modelling methodology for heat exchanger thermofluid networks <i>Kristina Laugsch; Pieter Rousseau; Ryno Laubscher</i></p> <p>The Quantification of Skin Colour using AI <i>Temweka Chirwa; Simon Connell; Charis Harley; Kennedy Otwo be; Modiehi Mosala; Ebrahim Variava; Firdaus Nabeemeeah; Neil Martinson</i></p>	<p>A variational framework for microscopically motivated modelling of ferroelectric materials <i>Felix Sutter; Marc Kamlah</i></p> <p>A computational magnetohydrodynamic modelling study on plasma arc behaviour in gasification applications <i>Quinn Reynolds; Thokozile Kekana; Buhle Xakalash</i></p> <p>CFD Modelling of gas-solid reactions: Analysis of iron and manganese oxides reduction with hydrogen <i>Mopeli Khama; Quinn Reynolds</i></p> <p>Modelling of sea ice formation using the phase-field method <i>Emmanuel Omatuku; Sebastian Skatulla; Marcello Vichi; Jörg Schröder; Tim Ricken</i></p> <p>Finite element analysis of the effects of the viscoelastic properties of the achilles tendon on stress and strain <i>Cornel Stander; Andie de Villiers; Sebastian Skatulla; Claudio Pizzolato</i></p>	
<p>Closing Function 15:15 - 16:00</p>		

