ICIAM 2019 VALENCIA

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PROGRAM & ABSTRACTS BOOK

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Abstract: The relationship between division of labor and worker spatial behavior in social insect colonies provides a useful context to study how social interactions influence the spread of agent (e.g., information or virus) under varied environmental conditions. We use variation in movement patterns associated with different tasks to build and study an agent based model to understand how different spatial and enviornmental attributes affect social contact and spreading dynamics.

MS A6-1-2 9 **11:00-13:00**
Shape Analysis and Optimization - Part 2
For Part 1 see: MS A6-1-2 8
For Part 3 see: MS A6-1-2 10
Organizer: Welker Kathrin — Helmut-Schmidt-University
Organizer: Kevin Sturm — TU Wien, Institut für Analysis and Scientific

Abstract: Shape optimization is a classical topic which is of high importance in a wide range of applications, e.g., image segmentation, aerodynamic and acoustic design optimization. Analytical and computational approaches in shape optimization have a long history. In particular, challenges arise in the context of applications involving partial differential equations or uncertainties. In this minisymposia recents results in shape analysis and optimization will be presented. Topics range from stabilization of partial differential equations, over classical shape optimization and stochastic shape optimization to shape analysis.

11:00-11:30
On necessary optimality for shape optimization problems constrained by variational inequalities
Welker Kathrin — Helmut Schmidt University
Schulz Volker — Trier University
Luft Daniel — Trier University
Abstract: We consider shape optimization problems constrained by variational inequalities (VI) in shape spaces, which are highly challenging because of two main reasons. First, one needs to operate in inherently non-linear and infinite-dimensional spaces. Second, the existence of the shape derivative is not guaranteed, which imply that the problem cannot be solved without any regularization techniques. We investigate analytically and computationally a VI constrained shape optimization problem with respect to its first-order necessary optimality conditions.

11:30-12:00
On efficient numerical methods for shape optimization
Schulz Volker — Trier University
Abstract: Shape optimization is a very active field of research with challenges from theory, as well as, from applications. This talk discusses novel approaches to the numerical solution of shape optimization problems. These are based on the investigation of 2nd order shape information and an appropriate coupling with mesh deformation strategies. Theoretical insight, as well as, numerical results are provided.

12:00-12:30
Free and Moving Boundary Problems and Transfinite Interpolations
Delfour Michel — Université de Montréal
André Garon — Ecole Polytechnique, Montreal, Canada

Abstract:
This paper is motivated by applications in numerical analysis of free/moving boundary problems, ALE methods, and iterative schemes in shape/topological optimization. It generalizes the Transfinite Mean value Interpolation of Dyken-Floater and introduce the k-Transfinite Barycentric Interpolation on compact H
d-rectifiable subsets E of R
n, 0
d_in. Dynamical versions are introduced to iteratively construct the rate of change of the position of the points of R
n E from the rate of change of the points of E.

12:30-13:00
Recent advances in nonsmooth shape optimization
Antoine Laurain — University of São Paulo
Abstract: We will see some recent results about distributed and boundary expressions of first and second order shape derivatives for several classes of nonsmooth domains such as Lipschitz domains or polygons. Depending on the type of nonsmoothness, different boundary expressions can be derived from the distributed expressions, which requires a careful study of the regularity of the solution to the underlying PDE. We will show applications to shape Hessians for polygons and to level set methods.

MS FT-2-4 9 **11:00-13:00**
Reduced Order Modeling for Parametric CFD Problems - Part 3
For Part 1 see: MS FT-2-4 7
For Part 2 see: MS FT-2-4 8
For Part 4 see: MS FT-2-4 10
Organizer: Annalisa Quaini — University of Houston
Organizer: Yanlai Chen — University of Massachusetts, Dartmouth
Organizer: Gianluigi Rozza — SISSA, International School for Advanced Studies Trieste

MS Organized by: SIAG/CSE
Abstract: Large-scale computing is recurrent in several contexts such as fluid dynamics, due to the high computational complexity in solving parametric and/or stochastic systems. This often leads to an unaffordable computational burden, especially when dealing with real-world applications, real-time or multi-query computing. In order to lessen this computational burden, reduced-order modeling (ROM) techniques play a crucial role: they aim to capture the most important features of the problem at hand without giving up accuracy. This minisymposium focuses on the development and application of ROM techniques in computational fluid dynamics for direct and inverse modeling, and for control, optimization and design purposes.

11:00-11:30
Certified Offline-Free Reduced Basis methods for stochastic differential equations driven by arbitrary types of noises
Yanlai Chen — University of Massachusetts, Dartmouth
Yong Liu — University of Science and Technology of China
Tianheng Chen — Brown University
Chi-Wang Shu — Brown University
Abstract: We present a new reduced basis method tailored for the linear ordinary and partial differential equations driven by arbitrary types of noise. Main novel ingredients are a new space-time-like treatment for ODEs and PDEs based on time-stepping, an accurate yet efficient compression technique for the spatial component of the space-time snapshots of RBM, a non-conventional ``parameterization'' of a non-parametric problem, and finally a RBM that is free of any dedicated offline procedure and online efficient.

11:30-12:00
A L1-based Reduced Over Collocation method for parametrized nonlinear partial differential equations
Lijie Ji — Shanghai Jiaotong University
Yanlai Chen — Department of Mathematics,University of Massachusetts Dartmouth
Sigal Gottlieb — Department of Mathematics,University of Massachusetts Dartmouth
Yvon Maday — Sorbonne Universities, UPMC Univ Paris 06
Zhenli Xu — School of Mathematical Sciences, Shanghai Jiao Tong University
Abstract: In this report, we introduce the L1-based reduced over collocation method (L1-ROC) that is stable and Empirical Interpolation-Free. There are two ingredients of the L1-ROC method. First is a strategy to collocate at (up to) the same number as many locations as the number of basis. Second is a recently introduced L1 approach for the strategic selection of parameter values to build the reduced solution space.

12:00-12:30
Online adaptive basis refinement and compression for reduced-order models
Philip Etter — Stanford University
Kevin Carlberg — Sandia National Laboratories
Abstract: We present a novel adaptive reduced-order model (ROM) refinement and compression algorithm for efficiently gauranteeing the