PDEs and Geometry: Numerical Aspects

Mar 11 - 15, 2024

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Organizing Committee

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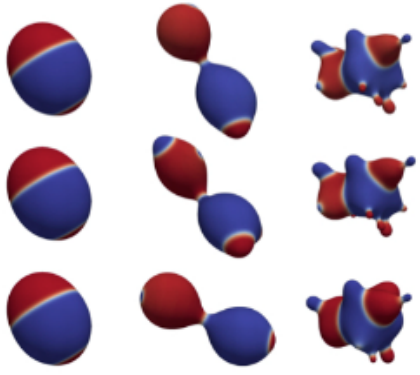
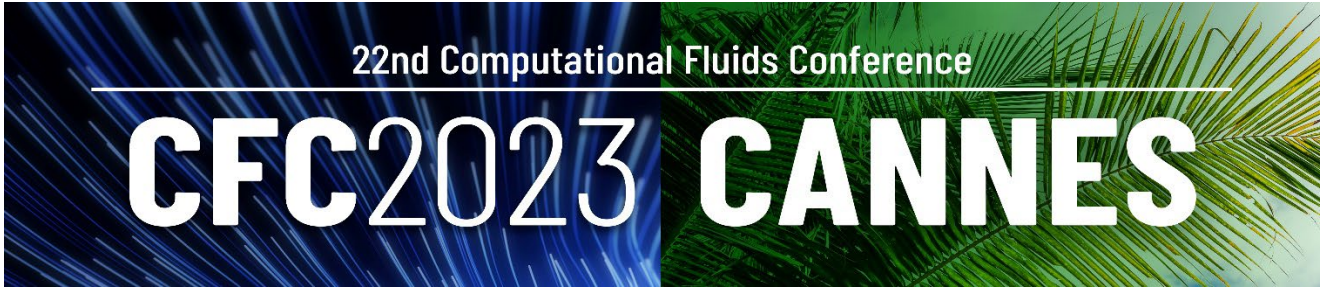
  University of Houston
- Brittany Hamfeldt
  New Jersey Institute of Technology
- Axel Voigt
  Institute of Scientific Computing - Technische Universitat Dresden
- Michael Neilan
  University of Pittsburgh

Abstract

The development and analysis of numerical methods for PDEs whose formulation or interpretation is derived from an underlying geometry is a persistent challenge in numerical analysis. Examples include PDEs posed on complicated manifolds or graphs, PDEs that describe interactions across complex interfaces, and equations derived from intrinsically geometric concepts such as curvature-driven flows or highly nonlinear Monge-Ampere equations arising in optimal transport. In recent years, these PDEs have gained significance in diverse areas such as machine learning, optical design problems, meteorology, medical imaging, and beyond. Hence, the development of numerical methods for this class of PDEs is poised to lead to breakthroughs for a wide range of timely problems. However, designing methods to accurately and efficiently solve these PDEs requires careful consideration of the interactions between discretization methods, the PDE operators, and the underlying geometric properties.

This workshop aims to foster new interactions and collaborations between researchers in PDEs related to geometry. The expertise of the participants will span the analysis, computational implementation, and application of these problems. This collaborative effort will facilitate the identification of key problems in the field and the development of novel discretizations that respect both the underlying geometry of the problem and the needs of current applications.





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MS5-02C Computational Fluid Mechanics with Free and Moving Boundaries: Methods and Applications

Wed, 26/04/2023
16:00 - 18:00
Auditorium H
MS5-02C

Chaired by:
Phd. Alec Kucala (Sandia National Labs) , Dr. Scott Roberts (Sandia National Laboratories)

Contributions in this session:

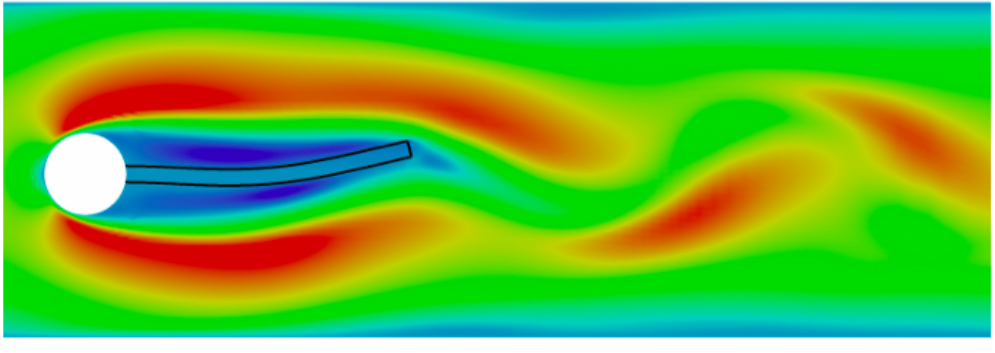
- Keynote A one-velocity-field monolithic method for fluid-structure interaction
  Y. Wang*, P. Jimack, M. Walkley, O. Pironneau
- EFPA An efficient and accurate iterative solution algorithm for fluid-structure interactions using an ALE finite element method
  G. Walton*, P. Jimack, M. Walkley
- EFPA A Moving-mesh Approach for Interface-tracking Multiphase Flow
  L. Li*, J. Xiang, C. Pain
- EFPA A space-time framework for periodic flows
  J. Lotz*, M. ten Eikelder, I. Akkerman
- A Verified Conforming Transient h-r Unstructured Adaptive Mesh Refinement (cThruAMR) Method for Capillary Hydrodynamics
  D. Noble*

14th WCCM & ECCOMAS Congress 2020

Virtual Congress 11-15 January, 2021

Computational Methods for Interface Problems Workshop

03 January 2019–04 January 2019, 9:00 am–2:00 pm



The workshop Computational Methods for Interface Problems will take place at UCL on Thursday 3rd January - Friday 4th January 2019

IUTAM Bookseries

Stefanie Gutschmidt
James N. Hewett
Mathieu Sellier *Editors*

IUTAM Symposium on Recent Advances in Moving Boundary Problems in Mechanics

Proceedings of the IUTAM Symposium on Moving Boundary Problems, Christchurch, New Zealand, February 12–15, 2018

Springer

WEDNESDAY 6 - FRIDAY 8 SEPTEMBER, 2017

UK Fluids Conference 6-8 September 2017

Date: Wednesday 6 - Friday 8 September, 2017
External URL: http://www.fluid-dynamics.leeds.ac.uk/uk-fluids-conference/

The EPSRC Centres for Doctoral Training (CDT) in Fluid Dynamics at the University of Leeds and Imperial College London are organising the second annual UK Fluids Conference. Our primary intention is to encourage greater cohesion and interaction amongst the fluids communities in the UK and to be of benefit, in particular, to PhD students. The first annual UK Fluids Conference took place at Imperial College London on 7 – 9 September 2016.

Read more about the UK Fluids Conference. http://www.fluid-dynamics.leeds.ac.uk/uk-fluids-conference/

Inaugural UK Fluids Conference

7-9 September 2016
Imperial College London

EPSRC
Engineering and Physical Sciences Research Council

Imperial College London

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Internationales Wissenschaftsforum Heidelberg

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GESCHÄFTSFÜHRERIN:
Dr. Ellen Peerenboom

IWH SYMPOSIUM

SIMULATION AND OPTIMIZATION OF EXTREME FLUIDS

October 10-12, 2016

SPEAKERS:

Malte Braack, Universität Kiel
Roland Becker, Université de Pau
Erik Burman, University College London
Miguel Angel Fernandez, INRIA de Paris
Giovanni Galdi, University of Pittsburg
Celine Grandmont, INRIA Paris-Rocquencourt
Gabor Janiga, Universität Magdeburg
Olivier Pironneau, Université Pierre-et-Marie-Curie
Andreas Prohl, Universität Tübingen
Stefan Turek, Technische Universität Dortmund
Christian Vergara, Politecnico di Milano
Thomas Wick, Ecole Polytechnique, Palaiseau
Winnifried Wollner, Technische Universität Darmstadt

CONTACT: **numerik.uni-hd.de/~sopef** | **sopef@iwr.uni-heidelberg.de**

ORGANISATION: **Interdisciplinary Center for Scientific Computing (IWR)**

SUPPORTED BY:

Bundesministerium für Bildung und Forschung

MATCH

HGS MathComp

IGDK 1754

Institute for Mathematical Sciences Event Archive

International Workshop on Fluid-Structure Interaction Problems (30 May - 3 June 2016)

Online registration form

Enquiries

General

Scientific aspects

Group Photo

Organizing Committee · Visitors and Participants · Overview · Activities · Venue

Organizing Committee

Co-Chairs

- Boo Cheong Khoo (National University of Singapore)
- Zhilin Li (North Carolina State University)
- Jie Liu (National University of Singapore)

Members

- Rajeev Jaiman (National University of Singapore)
- Ming-Chih Lai (National Chiao Tung University)
- Duc-Vinh Le (Institute of High Performance Computing)
- Jing Lou (Institute of High Performance Computing)
- Sheng Xu (Southern Methodist University)
- Wenjun Ying (Shanghai Jiaotong University)

Visitors and Participants

- Overseas visitors
- Local visitors
- Graduate students
- Registered local participants

Overview

Many problems in applied sciences and engineering involve the motion of geometric objects such as interfaces or filaments interacting with surrounding fluids. These problems are generally called fluid-structure interaction problems. Since the interface position is unknown and must be solved as part of the solution, this poses challenging difficulties from theoretical and numerical points of view. For the past decades, the research effort on those topics is overwhelming and is still popular in applied mathematics and engineering communities. This international workshop aims to bring together mathematicians, computational scientists, and engineers having a common interest in solving fluid-structure interaction problems. The ultimate goal is to


Institute for Mathematical Sciences