



4th Annual

Stokes Modelling Workshop

National University of Ireland, Galway

6 - 9 June 2017

Supported by MI-NET, Mathematics for Industry Network COST Action



Stokes Applied Mathematics Cluster
School of Mathematics, Statistics and Applied Mathematics
and
NUI Galway SIAM Student Chapter



ORGANISING COMMITTEE:

Michel Destrade, Roberto Galizia, Paul Greaney, Niall Madden, Martin Meere, Robert Mangan
Petri Piiroinen, Eoghan Staunton, Michael Welby, Giuseppe Zurlo

Welcome

Dear participant,

Welcome to 2017 Stokes Modelling Workshop. This is our 4th annual workshop, and the largest to date. The series was originally devised as a means of introducing undergraduate students to collaborative research and real-world problem solving, usually guided by staff and research students from the School of Mathematics, Statistics, and Applied Mathematics. These were largely organised by the student members of our SIAM Chapter.

This year, for the first time, we are funded, in part, by MI-NET, the *Mathematics for Industry Network* COST Action. This has allowed us to extend the workshop in a number of ways:

- Involve industry partners who have proposed problems that you will be working on this week;
- Bring skilled and experienced mentors to NUI Galway to support teams;
- Widen the participation to involve graduate students from near and far.

Nonetheless, the main core principles of our first three workshops remain in place: we welcome undergraduate and graduate participants from different disciplines, encourage creative thinking, clear communication, and supportive team work.

We are delighted to welcome our mentors, Art, Doireann, John, Luca and Tuoi, and look forward to working with them, and learning from them, over the coming week.

We are grateful to our industrial partners from IBM Research, Medtronic, and MET Eireann for providing problems of industrial and societal relevance, and for being present (in person or virtually) to present these problems.

Ostensibly, our collective goal will be to optimally pack catheters, place rainfall radar equipment, model rivers converging, visualise 3D objects using 2D images, and get ketchup out of a bottle. More fundamentally, our aims are to raise awareness of the potential of mathematical modelling in industry and society, to challenge ourselves to think creatively, and to apply our mathematical skills and knowledge to real-world problems.

We hope to create a relaxed environment, where everyone can contribute their talents and skills, and work together collaboratively.

We would like to express our gratitude to the School of Mathematics, Statistics and Applied Mathematics who, through the Stokes Applied Mathematics Cluster have provided support for undergraduate participants, to the NUI Galway SIAM Chapter, and, of course, MI-NET.

Dr Niall Madden (Head of the Stokes Applied Mathematics Cluster)

On behalf of the organising committee.

Participants

Name	Institution	Name	Institution
Al Baydli, Daher	NUI Galway	Marshall, Christine	NUI Galway
Allen, James	University of Surrey	Martin, Richard	NUI Galway
Alssaedi, Faiza	NUI Galway	Mary, Rose	IT Carlow
Atan, Reduan	NUI Galway	Mayah, Faik	NUI Galway
Burke, Richard	NUI Galway	Moran, Claire	NUI Galway
Cloherly, Philip	NUI Galway	Okeke, Saviour	IT Carlow
Collins, Jack	NUI Galway	Onaga, Tomokatsu	University of Kyoto
Colson, David	NUI Galway	Phoenix, Anna	NUI Galway
Conroy Broderick, Hannah	NUI Galway	Qiu, Songkai	NUI Galway
Cormican, John	NUI Galway	Rawle, Noeleen	NUI Galway
Donnelly, Cliona	NUI Galway	Regan, Brian	NUI Galway
Dubovskaya, Alina	University of Limerick	Samantray, Suman	NUI Galway
Galizia, Roberto	NUI Galway	Sheil, Ashley	Maynooth University
Geraghty, Samuel	NUI Galway	Smyth, David	NUI Galway
Greaney, Paul	NUI Galway	Staunton, Eoghan	NUI Galway
Hanley, Tracey	NUI Galway	Suleiman, Issah Nazif	Univeristy of Verona
Hill, Aoife	NUI Galway	Urbas, Szymon	NUI Galway
Hill, Róisín	NUI Galway	Walsh, Dylan	NUI Galway
Kamperis, Sam	Oxford Brookes	Walsh, Shane	UCD
Mangan, Robert	NUI Galway	Wisdom, Adrian	NUI Galway

Trainers

Name	Institution
John Donohue	MACSI, University of Limerick
Artur Gower	University of Manchester
Luca Manzari	Stockholm's Royal Institute of Technology
Fergus McAuliffe	iCRAG – University College Dublin
Doireann O'Kiely	University of Oxford
Thi Ngoc Tuoi Vo	MACSI, University of Limerick

Industry partners

Name	Institution
Colm Clancy,	MET Eireann
David Clarke	Medtronic
Jack O'Callaghan	Medtronic
Seshu Tirupathi	IBM Research

Stokes Modelling Workshop, 6-9 June, NUI Galway: Draft Schedule

	Tuesday, 6 June	Wednesday, 7 June	Thursday, 8 June	Friday, 9 June
09:00	Registration from 9.15 Foyer, Arts Millennium Building	Tea/Coffee , THB-G011		
09:30		Fergus McAuliffe: Science Communication Workshop THB-G010 (Library Building)	Work on Problems	
10:00	Problem Presentations, AM150			
10:30	Seshu Tirupathi, IBM;			
11:00	David Clarke, Jack O'Callaghan, Medtronic;	Break 10.45-11.00	Tea/Coffee , ADB-G021	
11:30	Luca Manzari, KTH; Colm Clancy, MET Eireann; Doireann O'Kiely, Oxford.		John Donohue: Protection effects in predator-prey systems	Work on Problems
12:00	Tea/Coffee , ADB-G021		Luca Manzari: Look but don't touch! Toward non-contact measurement techniques and solutions for the characterization of anisotropic, viscoelastic materials	
12:30	Group Allocation / Meet with Mentors	Work on Problems		
13:00	Lunch An Bialann	Lunch An Bialann	Lunch An Bialann	Lunch An Bialann
13:30				
14:00		Tuoi Vo: Mathematical models of drug release from drug-eluting stents		
14:30		Doireann O'Kiely: mathematical models for glass manufacture (with asymptotics + FEniCS)	Work on Problems	Team Presentations
15:00	Work on Problems			
15:30	Tea/Coffee , ADB-G021	Tea/Coffee , ADB-G021	Tea/Coffee , ADB-G021	
16:00				Closing
16:30				
17:00	Work on Problems	Work on Problems	Work on Problems	
17:30				
18:30			Networking Dinner The Brasserie, Eglinton St.	

Practicalities

Problem allocation: Presentations of the modelling problems will take place from 10:00am in AM150. After that, you will have the opportunity to indicate which problems you would like to work on; based on that, we'll allocate everyone to teams. Please make sure you complete your Problem Preference Form and return it to the organisers.

Wifi For Wifi Access, connect to NUIGWifi.

User ID: 9876001T

Password: htbps4729

Lunch: Most participants will have received vouchers valued at €7 which can be redeemed at An Bhialann.

Networking Dinner: There will be a Workshop Dinner for participants on Thursday at 6.45 in The Brasserie, Eglington St (to be confirmed). The cost of food (but not drinks) will be covered by the organisers.