AARMS CRG in
Numerical Analysis and Scientific Computing
DD Workshop Report
August 2015

1   Introduction

The AARMS CRG in Numerical Analysis and Scientific Computing was formed as of September 1, 2013. This note gives a summary of the domain decomposition workshop organized by the CRG in August of 2015.

2   Workshop on Domain Decomposition Methods for PDEs

A workshop titled "Domain Decomposition Methods for PDEs", organized by the CRG, was held at Dalhousie University, Halifax, Nova Scotia, Aug. 3–8, 2015. This workshop received funding from AARMS, the CRM, the Fields Institute, the NSF, the Memorial University Conference Fund, and the Department of Mathematics and Statistics of Memorial University. Administrative support was provided by the Department of Mathematics and Computer Science at Saint Mary's and the Department of Mathematics and Statistics at Dalhousie University.

The workshop was well attended with approximately 40 participants involved, including B.Sc., M.Sc., Ph.D. students and researchers from Canada, the United States, Turkey, Switzerland, China and the United Kingdom. There were four invited plenary speakers, 15 faculty members, 1 post-docs, 20 undergraduate and graduate students and 4 industry representatives.

This workshop consisted of three primary parts. The first part was a two-day short course on domain decomposition methods for PDEs, given by Dr. Martin Gander of the University of Geneve, a leading expert in this area. Each day included approximately five hours of lectures given by Dr. Gander, and concluded with a hands-on computer lab session, led by Dr. Victorita Dolean of the University of Stratclyde opportunity to learn about software implementations of some of the algorithms discussed in the lectures.

An important feature of the short course and computer lab sessions was the degree of interaction between the instructors and the participants; questions were frequent and often added important insight into the material being presented.

The workshop then transistioned to four plenary talks. David Keyes (KAUST) gave a visionary talk entitled "Scalable Nonlinearly Implicit Methods for Multiscale Science and Engineering Applications". Victorita Dolean (Strathclyde) spoke on "Robust Coarse Spaces via Generalised Eigenproblems: the GenEO method". Felix Kwok (HKBU), gave a nice talk with the title "Schwarz Methods for the Time-Parallel Solution of Parabolic Control Problems". The last plenary talk was given by Martin Gander (Geneva) who gave a beautiful overview on "Five Decades of Time Parallel Time Integration". These talks were all very well prepared; it was a valuable experience for all in attendance to get a summary of the latest results in the field from these adaptivity experts.

The final phase of the workshop began with applied talks by Tom Jonsthovel (Schlumberger), Hansong Tang (City College of New York, CUNY), and Rick Link and Derrick Alexander (Lloyd's Register Technology Group (ATG)). These speakers nicely outlined problems in their primary research area that would benefit from the use of domain decomposition techniques. These talks were followed by one and a half days of breakout sessions, which allowed interested participants the opportunity to pair with these applied researchers and domain decomposition experts to explore the applied problems in greater detail. The breakout sessions represented a novel part of the workshop and were very well received. These sessions were quite successful in forging future collaborations and introducing potential M.Sc. and Ph.D. students to researchers at the forefront of their fields.

A complete list of participants and a complete tentative budget (subject to final approval by all of the funding entities) is attached.

First Name	Last Name	Occupation	Company
Faysol	Ahmed	Graduate or Undergraduate Student	Memorial University of Newfoundland
Iftikhar	Ali	Graduate or Undergraduate Student	King Fahd University of Petroleum and Minerals
Susanne	Bradley	Graduate or Undergraduate Student	University of British Columbia
Hermann	Brunner	Faculty	Memorial University of Newfoundland
Herman	Brunner	Faculty	Memorial University of Newfoundland
Kevin	Buchan	Staff	Saint Mary's University
Duo	Cao	Graduate or Undergraduate Student	Purdue University
Gfei	Cao	Graduate or Undergraduate Student	Penn State University
Yangang	Chen	Graduate or Undergraduate Student	University of Waterloo
Victorita	Dolean	Faculty	University of Strathclyde
Matthew	Emmett	Industry	Computer Modelling Group Ltd.
Martin	Gander	Faculty	University of Geneva
Jose	Garay	Graduate or Undergraduate Student	Temple University
Christian	Glusa	Graduate or Undergraduate Student	DAM, Brown University
Danielle	Goodfellow	Staff	Saint Mary's University
Yuying	Gosser	Faculty	The City College of CUNY
Ronald	Haynes	Faculty	Memorial University of Newfoundland
Onwuke	Ijioma	Post Doc	Abia State University
David	Iron	Faculty	Dalhousie
Tom	Jonsthovel	Industry	Schlumberger Oilfield UK
Richard	Karsten	Faculty	Acadia University
benjamin	kary	Graduate or Undergraduate Student	Memorial University
Adem	kaya	Graduate or Undergraduate Student	Izmir Institute of Technology
David	Keyes	Faculty	KAUST
Nathan	King	Graduate or Undergraduate Student	Simon Fraser University
Ja-Keoung	Koo	Graduate or Undergraduate Student	Chung-ang University
Wing Hong Felix	Kwok	Faculty	Hong Kong Baptist University
Rick	Link	Industry	Lloyd's Register Applied Technololgy Group
Scott	MacLachlan	Faculty	Memorial University of Newfoundland
Boštjan	Mavrič	Graduate or Undergraduate Student	Institute of Metals and Technology
Neil	McCormick	Industry	Lloyd's Register Applied Technology Group
Geoff	McGregor	Graduate or Undergraduate Student	McGill University Mathematics and Statistics

Khaled	Mohammad	Graduate or Undergraduate Student	Memorial University
Paul	Muir	Faculty	Saint Mary's University
Dominique	Poirel	Faculty	Royal Military College of Canada
Zhaonan	Qu	Graduate or Undergraduate Student	Princeton University
Abu Naser	Sarker	Graduate or Undergraduate Student	Memorial University of Newfoundland
Lukas	Spies	Graduate or Undergraduate Student	Memorial University
Hansong	Tang	Faculty	City College of NewYork, CUNY
Xi Yuan	Yin	Graduate or Undergraduate Student	McGill University
Jianming	Zhang	Faculty	Hunan University

2015 AARMS WORKSHOP ON DD METHODS TO PDE'S
DEPT. MATHEMATICS AND STATISTICS, MEMORIAL UNIVERSITY OF NEWFOUNDLAND
HELD AT DALHOUSIE, AUGUST 3-8, 2015

	REVENUE	EXPENSES	BALANCE
REVENUE - CRM	$ 5,000.00		
REVENUE - FIELDS	$ 5,000.00		
REVENUE - AARMS Conference Fund	$ 7,500.00		
REVENUE - MATH DEPT., MUN	$ 2,000.00		
REVENUE - MUN Conference Fund	$ 2,000.00		
REVENUE - WORKSHOP REGISTRATION FEES	$ 4,064.01		
TOTAL REVENUE:			$ 25,564.01

EXPENSES

		EXPENSES	BALANCE
INVOICE FROM ST. MARY'S UNIVERSITY:			
Salary/Benefits: $432.58			
Conference Materials: $13.65			
Invited Guests & Student Travel: $17,238.17		$ 17,684.40	$ 7,879.61
INVOICE FROM DALHOUSIE - COFFEE BREAKS		$ 763.60	$ 7,116.01
REIMBURSE R. HAYNES:			
Banquet: $2,330.00 ($579.01 Alcohol costs included)		$ 2,330.00	$ 4,786.01
Welcome Reception: $1800.53 (380.72 Alcohol costs included)		$ 1,800.53	$ 2,985.48
TOTAL EXPENSES:		$ 22,578.53	
BALANCE REMAINING:			$ 2,985.48

COST BREAKDOWN:

ST. MARY'S: $17,684.40
$2000.00 - Travel - Students/Postdocs - MUN CONFERENCE FUND
$432.58 - Salaries - AARMS
$13.65 - Materials - AARMS
$5000.00 - Travel - CRM
$5000.00 - Travel - FIELDS
$2000.00 - Travel - MUN MATH
$3119.37 - Travel - AARMS
$118.80 - Travel - CONFERENCE REGISTRATION $$$
TOTAL: $17,684.40

DALHOUSIE: $763.60
$763.60 - Coffee Breaks - AARMS

REIMBURSEMENT - R. HAYNES - BANQUET: $2,330.00
$1750.99 Food - AARMS
$579.01 Alcohol - WORKSHOP REGISTRATION $$$

REIMBURSEMENT - R. HAYNES - WELCOME RECEPTION: $1800.53
$1419.81 Food - AARMS
$380.72 Alcohol - WORKSHOP REGISTRATION $$$

FUNDING SOURCE BREAKDOWN:

MUN CONFERENCE FUND: $2000 Travel - Students/Posdocs

AARMS: $7500
$432.58 - Salaries - St. Mary's
$13.65 - Materials - St. Mary's
$3119.37 - Travel
$763.60 - Coffee Breaks - Dalhousie
$1750.99 - Reimburse Haynes - Banquet (excluding alcohol)
$1419.81 - Reimburse Haynes - Wel. Reception (exlud. alcohol)

CRM: $5000 - Travel

FIELDS: $5000 - Travel

MATH MUN: $2000 - Travel

REGISTRATION FEES: $4064.01
$959.73 - Alcohol - Banquet & Welcome Reception
$118.80 - Travel
Balance remaining in Registration Fee $: $2985.48