

# XINZHE WU

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Website: <http://brunowu.github.io>

## PERSONAL PROFILE

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A Computer Science Ph.D. student in High Performance Computing (HPC) and numerical algebra algorithms, smart working, reliable with good technical and communication skills. Always willing to learn, good eye for details, happy to work both independently and as a part of team.

## RESEARCH INTERESTS

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- **HPC:** Parallel Programming, Scientific Computing, Computer Architecture
- **Numerical Algebra Algorithms:** Eigenvalue problems, non-Hermitian linear systems, Krylov methods, parallel solvers and preconditioners

## EDUCATION

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### University Lille 1 of Sciences and Technologies

*Apr. 2016 - present, Lille, France*

Ph.D. in Computer Science & High Performance Computing

CRISTAL - Centre de Recherche en Informatique, Signal et Automatique de Lille

Advisor: Serge G. Petiton

### Ecole Centrale de Lille

*Sep. 2014 - Jun. 2015, Lille, France*

International exchange in Complex Systems Engineering.

### Beihang University

*Sep. 2013 - Jan. 2016, Beijing, China*

M.S. in Control Engineering

Ecole Centrale de Pékin

Advisor: Bohu Li

### Beihang University

*Sep. 2009 - Jun. 2013, Beijing, China*

B.S. in Mathematics and Applied Mathematics

## PEER-REVIEWED PUBLICATIONS

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- [Xinzhe Wu](#) and Serge G. Petiton, "A Distributed and Parallel Asynchronous Unite and Conquer Method to Solve Large Scale Non-Hermitian Linear Systems" in HPC Asia 2018: International Conference on High Performance Computing in Asia-Pacific Region, Tokyo, Japan. [[Full paper](#)]
- [Xinzhe Wu](#), Serge G. Petiton and Yutong Lu, "A Parallel Generator of Non-Hermitian Matrices computed from Given Spectra" in VECPAR 2018: 13th International Meeting on High Performance Computing for Computational Science, São Pedro, Brazil. [[Accepted](#)]
- [Xinzhe Wu](#) and Serge G. Petiton, "A Distributed and Parallel Unite and Conquer Method to Solve Sequences of Non-Hermitian Linear Systems". Submitted to Japan Journal of Industrial and Applied Mathematics. [[Under Review](#)]

## CONTRIBUTED AND INVITED TALKS

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- [Xinzhe Wu](#) and Serge G. Petiton, "A Parallel Generator of Non-Hermitian Matrices Computed from Given Spectra" in PMAA18: 10th International Workshop on Parallel Matrix Algorithms and Applications, Zurich, Switzerland. [[pdf](#)]

- Xinzhe Wu and Serge G. Petiton, "A Parallel Generator of Non-Hermitian Matrices Computed from Known Given Spectra" in 3rd Workshop on Parallel Programming Models - Productivity and Applications, Aachen, Germany. [pdf]
- Xinzhe Wu and Serge G. Petiton, "A Parallel Generator of Non-Hermitian Matrices Computed from Known Given Spectra" in SIAM PP18: SIAM Conference on Parallel Processing for Scientific Computing, Tokyo, Japan. [pdf]
- Serge G. Petiton and Xinzhe Wu, "The Unite and Conquer GMRES-LS/ERAM method to solve sequences of Linear Systems" in EPASA 2018: International Workshop on Eigenvalue Problems: Algorithms, Software and Applications, in Petascale Computing, Tsukuba, Japan.
- Xinzhe Wu and Serge G. Petiton, "A Distributed and Parallel Asynchronous Unite and Conquer Method to Solve Large Scale Non-Hermitian Linear Systems" in HPC Asia 2017: International Conference on High Performance Computing in Asia-Pacific Region, Tokyo, Japan. [pdf]
- Serge G. Petiton, Xinzhe Wu and Tao Chang, "A Distributed and Parallel Asynchronous Unite and Conquer Method to Solve Large Scale Non-Hermitian Linear Systems" in Preconditioning 2017: International Conference On Preconditioning Techniques For Scientific And Industrial Applications, Vancouver, Canada. [pdf]

## TECHNICAL REPORTS

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- Xinzhe Wu, "SMG2S Manual" in Maison de la Simulation, France - Version 1.0, 2018. [Online] Available: [https://smg2s.github.io/files/smg2s\\_manual.pdf](https://smg2s.github.io/files/smg2s_manual.pdf)

## POSTERS

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- Xinzhe Wu and Serge G. Petiton, "Large Non-Hermitian Matrix Generation with Given Spectra" in EPASA 2018: International Workshop on Eigenvalue Problems: Algorithms, Software and Applications, in Petascale Computing, Tsukuba, Japan. [pdf]

## SOFTWARES

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### SMG2S: Sparse Matrix Generator with Given Spectrum

- SMG2S is a parallel Implementation of C++/MPI which aims to evaluate and benchmark the iterative solvers for eigenvalue and linear system solvers on supercomputers. The interfaces to C, Python and the parallel scientific computing libraries such as PETSc and Trilinos are provided.
- Download stable version: [SMG2S-1.0.0.zip](#)
- Recent developing version is available on [Github](#)

### Krylov\_XMP

- Basic Krylov methods implementation in XcalableMP. This work has collaborated with Tao Chang during his internship
- Codes are available on [Github](#)

### UCGLE: Unite and Conquer GMRES/LS-ERAM method

- UCGLE is an implementation of a distributed and parallel method based on C/MPI and PETSc to solve very large non-Hermitian linear systems in large-scale homogenous and heterogenous clusters. It uses the static MPI communicator to support the asynchronous communication.
- Codes are available on [Github](#)

### UCMGLE: Unite and Conquer Multiple GMRES/LS-ERAM method

- UCMGLE is an special version UCGLE based on C++/MPI, Trilinos/Belos and Trilinos/Anasazi to solve very large non-Hermitian linear systems in large-scale homogenous and heterogenous clusters. The dynamic allocation of process using MPI\_SPAWN allows multiple GMRES and ERAM Components. Multiple GMRES allows to solve simultaneously non-Hermitian linear systems with multiple

right-hand sides using the Least Squares Polynomial preconditioning. It is comparable with deflated Block GMRES, but with less global communication.

- Codes are available on [Github](#)

## PROFESSIONAL EXPERIENCE

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### **Maison de la Simulation, CNRS USR3441. - Ph.D. Student**

*Apr. 2016 - now*

- Subject: Contribution to the Emergence of New Intelligent Distributed and Parallel Methods using a Multilevel Programming Paradigm for Extreme Computing
- Funded by ANR-DFG- JST project MYX.

### **Intern instructor**

*Jul. 2018 - Aug. 2018*

- Experimentation and development of an interface for software generating a non-Hermitian matrix from a given spectrum.
- Internship Student: Quentin Petit, student of Polytech Lille.
- Finance of Internship: contract of CNRS supported by MYX project.

### **National Supercomputer Center in Guangzhou - Visiting Scholar**

*Sept. 2017 - Oct. 2017*

- Research and Experiments of hybrid Krylov iterative methods to solve large-scale linear systems on world second supercomputer Tianhe-2.

### **Intern Co-instructor**

*May. 2017 - Sept. 2017*

- Experiments, evaluations, and improvements of scientific library elements for GPU or INTEL accelerator clusters to optimize distributed and parallel software implementing the GMRES-ERAM / LS method.
- Internship Student: Tao CHANG, master student of Ecole Centrale de Nantes.
- Finance of Internship: contract of Maison de la Simulation/CEA.

### **Biomouv, Paris. - Data Analyst (Internship)**

*Apr. 2015 - Sept. 2015*

- Analyse the medical data by different machine learning methods

### **China Aerospace Science and Industry Corp (Internship)**

*Jun. 2014 - Aug. 2014*

- Traffic system simulation of a commercial center based on Multi-Agents.

## PROJECTS

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### **IMPACT Project - Ecole Centrale de Lille**

**Genetic Algorithm** ♦ **Tabu Algorithm** ♦ **Matlab**

Study of different methods to solve the problem of Cross-dock door Assignment.

### **Collective Inovation Project - Ecole Centrale de Pékin**

**Optimization of the algorithm based on Radon space transformation**

Optimization of multitouch algorithms for infrared touch screens based on the transformation space.

### **Master Thesis - Beihang University**

**Simulation** ♦ **Multi-Agent**

Modeling and Simulation of Supply Chain Emergence Mechanism Based on Multi-Agent.

### **Bachelor Project - Beihang University**

**Hadoop** ♦ **Research Engine** ♦ **Java** ♦ **ElasticSearch**

Design and Implementation of a semantic distributed search engine.

## ACHIEVEMENTS AND AWARDS

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Admission to 2017 International HPC Summer School (IHPCSS)

- In Jun 2017, 80 selected attendees out of 351 applicants from European, Japanese, Canadian and U.S. institutions, one-week courses and challenge about High Performance Computing techniques in the University of Colorado, Boulder, USA. Traveling and lodging are sponsored by HPC organizations and projects including XSEDE(US), PRACE(EU), RIKEN(JP) and Compute Calcul Canada.

### **2009 National Higher Education Entrance Examination of China**

- Top 100 in Shanxi Province among 360,000 students.

## **TECHNICAL SKILLS**

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- Programming Language: Python, C, C++, MPI, OpenMP, CUDA, OpenAcc, MATLAB, Java, LaTeX, XcalableMP, YvetteML, R.
- Framework and Package: PETSc, SLEPc, Trilinos, Kokkos, BLAS, ScaLAPACK, CuSPARSE, TensorFlow, Hadoop, cmake, automake.

## **LANGUAGES**

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- English: Professional competence
- French: Professional competence
- Chinese: Native Language

## **DISCLAIMER**

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I hereby claim that is correct up to my knowledge.

## **REFERENCES**

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### **Serge G. Petiton - Professor**

- University Lille 1, Sciences and Technologies
- CNRS/CRISTAL, CNRS/Maison de la Simulation@Saclay
- Email: serge.petiton@univ-lille1.fr