Masaru NAGASO

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Experience

01.oct.2018–31.may.2019 **Scientific researcher**, Protisvalor/IUT-LCND, Aix-en-Procenve, France.
Numerical acoustic studies on propagation of a wave in a Sodium-cooled Fast Reactor using Spectral Element Method..
Development of an utility package for Spectral-element full-wave simulation code SPECFEM2D and SPECFEM3D. This package is developed to add an user interface for simulation configuration, mesh preparation and some additional post-processing functions. Also, this package installs/compiles all the libraries including SPECFEM automatically for any kind of modern operating systems.

02.fev.2015–31.may.2018 **PhD candidate**, CEA Cadarache, Saint-Paul-lez-Durance, France.
Research and development on numerical modeling method for a wave propagation in a realistic fluctuating acoustic medium.
2D and 3D elasto-acoustic wave propagation simulation in Sodium-cooled fast reactors, which is an application for acoustic thermometry to detect accurate and instantaneous temperature in sodium jets.

Education

2015–2018 **PhD**, *Aix-Marseille University*, Aix-en-Procenve, France.
Acoustics

2011–2014 **MSc**, *The University of Tokyo*, Tokyo, Japan.
Ocean Technology, Policy and Environment

2007–2011 **BSc**, *Tokyo University of Science*, Chiba, Japan.
Mechanical Engineering

PhD thesis

title *Study of ultrasound wave propagation in a heterogeneous fluid medium for the continuous monitoring of an operating sodium-based nuclear reactor*

supervisors Dr. Dimitri Komatitsch, Prof. Joseph Moysan
(Laboratoire de mécanique et dacoustique(LMA), CNRS/Luniversité dAix-Marseille)
Dr. Christian Lhuillier
(Le Laboratoire d'instrumentations et d'essais technologiques, CEA Cadarache)

description Application of spectral element method and finite-element time-domain methods for wave propagation simulation in a heterogeneous medium.
Numerical modeling of a wave propagation in side of 4th generation sodium cooled fast reactor.
Two french super computers, CURIE@TGCC/CEA, OCCIGEN@CINES were used for the 4D (3D wave simulation + temporal fluctuating heterogeneous situation) massive calculations.

Master thesis

title *Development of the three-dimensional visualization and measurement method for identification of sex and species of small size fish using 25MHz-focusing acoustic probe.*

supervisors Prof. Akira Asada
(The Underwater Acoustic System Engineering Laboratory, Institute of Industrial Science, The University of Tokyo)

description Acoustic measurement of fish bodies using a high-frequency focusing acoustic probe.
Development of a software for acoustic signal processing and 3D visualization of fish bodies, acoustic reflection intensity image of body surface and internal organs.
FDTD simulation of a wave propagation inside of fish bodies.
(Implementation of FDTD for elastic wave and PML damping layer.)

Bachelor thesis

title *Elasto-plastic J-integral calculation using the tetrahedral finite element model.*

supervisors Prof. Hiroshi Okada
(The Laboratory of Computational Solid Mechanics, Tokyo University of Science)

description Application of J-integral method to elasto-plastic FEM analysis using tetrahedral mesh.
Improvement of mesh generation software for FEM analysis
Reformation of a visualization software for the calculation models and results.

Weekend projects

subject *Network clustering application*

description Implementation of hierarchical network clustering code based on Map equation and Modularity.
Keywords: Map equation, Modularity, Louvain method, Page rank,

subject *The numerical computation library for estimation of subject times*

description Python library for calculating the subject time (i.e. temporal position indicating the degree of progress in a disease) written in C++ and wrapped by swig.
In the calculation routine of this library, nonlinear mixed effect modeling was implemented for calculating averaged curves of multiple bio-markers (i.e. fixed effects) and random parts which depends on each subject.
Golden search algorithm was also implemented during the routine.
This code was developed as a part of research project by Dr. Keita Tokuda, a project researcher at The University of Tokyo Hospital.
Keywords: Maximum likelihood estimation, Nonlinear mixed effect model, Golden search.

subject *Improvement of multi-label classification using C2AE and fine-tuning with Transformer-lm*

description In order to improve the accuracy of multi-label classification task with Canonical Correlated AutoEncoder (C2AE) for limited amount of input texts, we applied the method of "Improving Language Understanding by Generative Pre-Training" so called (finetune-transformer-lm).
Keywords: Natural language processing, Deep Learning, multi-label classification, Transformer, Language model, C2AE

subject *Generation of semantic networks with review texts of popular products and generation of learning model for creating a new hit product*

description This is a part of another research project on "computational creativity" by Dr. Akihito Sudo, a researcher/research manager at The University of Shizuoka.
First, we generates two semantic networks, one is generated from reviews texts written for a hit product and another is from reviews for multiple products in the category which the target product belongs to.
By using these semantic networks and difference between them as a data set, we are trying to generate learning model to generate keywords for the next hit products.
Keywords: Natural language processing, word2vec, Semantic network, Machine learning, SMOTE.

subject *Web scraping scripts*

description This is a set of scraping scripts developed for gathering review texts from Amazon.com for generating semantic networks concerning the above project.
A python library "Scrapy" was used as the engine of scraping spiders. Keywords: Web Scraping,

Technical skills

Operating systems	Linux, OS X, Windows, Slurm, Gcloud
Programming languages etc.	C, C++, C#, Fortran, Python, Swig, MPI, OpenMP, VTK, HDF5, Chuck, Markdown, LaTeX
Web tools	xhtml, css, JavaScript, Node.js, MySQL, Mongodb, Google Big Query
Development environments	Docker, Vim, Visual Studio Code, Git, SVN, Redmine, Bitbucket
Analysis tools	Jupyter notebook (lab), Matplotlib, Holoviews
Other softwares	Microsoft Word, Excel, PowerPoint, Adobe Photoshop, Adobe Illustrator, Gimp, Inkscape
Music theory	Knowledge and experiences of modal/codal music
Instruments	Piano, Hammond Organ, Synthesizer, Saxophones

Languages

- Japanese (First language)
- English (Fluent)
- French (Basic)

Conferences

2017 8th ANNIMA (International conference on Advancements in Nuclear Instrumentation Measurement Methods and their Applications) in Liège. Poster session.

2016 19th WCNDT (World Conference on Non-Destructive Testing) in Munich. Oral session.

2013 Oceans 13 MTS/IEEE in San Diego. Student Poster Competition.

Publications

M. Nagaso. *Study of ultrasound wave propagation in a heterogeneous fluid medium for the monitoring of an operating sodium-based nuclear reactor*. Theses, Université d'Aix Marseille, May 2018.

M. Nagaso, D. Komatitsch, J. Moysan, and C. Lhuillier. Numerical simulation of ultrasonic wave propagation in a sodium cooling system in an inhomogeneous temperature field using the spectral-element method. In *19th World Conference on Non-Destructive Testing*, Münich, Germany, Jun 2016.

M. Nagaso, D. Komatitsch, J. Moysan, and C. Lhuillier. Wave propagation simulation in the upper core of sodium-cooled fast reactors using a spectral-element method for heterogeneous media. *8th ANNIMA*, 170:03006, 2018.

M. Nagaso, K. Mizuno, A. Asada, K. Kobayashi, and M. Matsukawa. Development of the three-dimensional visualization method for the inner structure of small size fish using 25 mhz acoustic profile measurement. In *2013 OCEANS - San Diego*, pages 1–4, Sept 2013.

M. Nagaso, K. Mizuno, A. Asada, K. Kobayashi, and M. Matsukawa. Experimental and finite-difference time-domain simulation study of the precise measurement

of the gonad of a small fish using a 25-mhz acoustic focus probe. *Marine Technology Society Journal*, 49(5):31–37, Sept 2015.

M. Nagaso, J. Moysan, S. Benjeddou, N. Massacret, M. A. Ploix, D. Komatitsch, and C. Lhuillier. Ultrasonic thermometry simulation in a random fluctuating medium: Evidence of the acoustic signature of a one-percent temperature difference. *Ultrasonics*, 68:61–70, May 2016.

References

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To whom it may concern

I appreciate your considering my application for the position "Expert(e) en calcul scientifique (H/F)". My background and skills in laboratory techniques will prove to be an effective match for your qualifications requirements.

My main academic/engineering interest is on the techniques of numerical modeling especially for wave propagation. The interest in acoustics have been cultivated through my experiences of Jazz studies which is one of my important lifeworks. In order to study another aspect of sound, as my masters research, I started learning underwater (ocean) acoustics and developed an acoustic CT scanning method for sex/species detection using 25 MHz focusing probe. For this objective, I developed numerical codes for signal processing, image reconstruction and in-house FDTD code (MPI was used for parallelization) for simulating the wave propagation in side of fish body, which were important experiences that motivated me to progress my study to the direction of numerical techniques.

In order to expand my experience on acoustics and numerical analysis, I carried out (mainly) numerical studies on wave propagation in a cooling circuit of Sodium-cooled Fast Reactors with French Atomic Commission (CEA) and French Centre National de la Recherche Scientifique (CNRS). In this PhD project, I experienced to use SPECFEM3D which is the target of this post-doc project. For the specific objectives of my PhD study, I needed to modify the small part of SPECFEM3D i.e. taking the CFC calculated 3D temperature field into SPECFEM3D calculation. At the same time, I developed additional pre/post processing tools e.g. a C++ code for conversion of mesh data format exodos->SPECFEM3D, signal file format converter (numerous ASCII file to one hdf5 file, then to VTK for 3D visualization of a wave front). To modify partially the code of SPECFEM and implementing additional utility, I have carefully read the codes of SPECFEM3D and understood its composition, which mush be an essential requirement for the candidates of this post-doc position. During this PhD, we used two french super computers (CURIE at Très Grand Centre de calcul du CEA, OCCIGEN at Centre Informatique National de lEnseignement Supérieur) for running a 3D calculation of SPECFEM3D, that is also the good experience required for this position.

In my private development projects, I often use Docker and Swig. Docker is the software which composes an linux environment with all dependencies (i.e. linux libraries) in the form of ready-to-use, thus recently, modern numerical libraries initially attach the docker configuration file. With using docker, users may avoid time consuming steps for dependencies' installation and compiling the numerical codes. Swig is the tool which add a python wrapper (or API) to the codes written in compiled languages e.g. Fortran, C++ etc. This is also the general composition of modern numerical code i.e. the part of library which do the heavy computation are written in C++ or Fortran then simulation configuration, passing the input data (mesh file, in/output paths) and retrieving the result

with the python functions implemented with swig (or other tools). These experiences of software development may be a help the further development of SPECFEM3D.

My career goal is to familiarize with HPC computing and write my own simulation code optimized for HPC use. Thus the research objective of this position and expected experiences that I will obtain exactly meet with my career path.

Thank you for your consideration. I would be grateful for the opportunity to speak with you in person regarding my qualifications for this position; please let me know if I can provide you with any additional information.

Yours faithfully,

Masaru NAGASO