

Division of Mathematical and Physical Sciences	Research field	Applied Computational Mathematics	Lab. ID MP16
Laboratory web site	http://cmpsci.s.kanazawa-u.ac.jp/CompCourse/English/people.html		
Research subjects			
<p>The goal of the research in our group is to apply mathematics and computers to solve various real world problems. The specialization of our faculty range from mathematical analysis of mathematical models for problems from physics, chemistry, economics and engineering, the investigation of various subjects of computational number theory and algebra, to the development of efficient and powerful numerical algorithms and computational methods, tailored specifically to the state-of-the-art supercomputers. The mathematical tools that we use in our work are mostly related to partial differential equations, numerical analysis, functional analysis, operator theory, spectral analysis, quantum mechanics, hypergeometric functions, computer algebra, etc.</p>			
Master/Doctor course: Education policy, curriculum, typical activity in the laboratory			
<p>Master course: Students take various classes/seminars that help them deepen the knowledge of various aspects of computational mathematics. During the second year they find a suitable research topic for their Master's thesis with the help of their supervisor. Doctoral course: Besides attending seminars, the students work on their own selected research topic. They publish their findings in a recognized journal. Most of the curriculum is available in English to be accessible for foreign students.</p>			
Daily life in the laboratory, etc.			
<p>Every student has access to a personal working desk and a desktop computer. For high-performance computations, the members of our lab can also use a performance computational cluster. The students are encouraged to engage in an informal discussion with other students and the faculty. We try to foster a friendly atmosphere. Many students come from other universities and foreign countries and therefore can offer a different perspective on various topics.</p>			
Message or comments by the laboratory faculty staffs			
<p>Computational mathematics has proved its potential in many industries. It is quite certain that it will increase in importance in coming years. The graduates from the Master program can therefore find employment as teachers, researchers and experts in technological companies, financial institutions, and research laboratories. Students who choose to pursue the Doctoral degree will receive an advanced knowledge that will give a strong foundation to become university lecturers or specialized researchers in this field.</p>			
Recent Master theses in these 3 years (+ more if appropriate)			
year.month	Thesis title (including English translation of Japanese thesis title)		
2017.9	A Numerical Method for Barrier Option Pricing		
2017.9	Numerical methods for the pricing of American options with stochastic volatility		
2017.9	Smoothed Particle Hydrodynamics Simulation of an Accretion Disk in a Cataclysmic Variable		
2017.9	Holonomic gradient method and its application in numerical evaluation of outage probability of MIMO systems		
2017.9	Finite Element Modeling of a Galactic Disc		
2017.3	Mathematical modeling of formation of penitentes		
2017.3	Numerical study of accuracy of discrete schemes for the curvature flow		
2017.3	On a sequence of the isospectral graphs generated from Paley graph		
2017.3	Comprehensive Groebner Systems over polynomial rings and its Applications		
2017.3	Mathematical analysis of a contact problem for an elastic body via the discrete Morse flow		
2016.9	Analysis of Energy Profile in Crack Problems and Application to Crack Control		
2016.9	A Numerical Method for the Pricing of Geometric Asian Options via the Finite Difference Method		
2016.9	A Phase Field Model of Crack Propagation in Thermoelasticity		
2016.9	Simulation of a Fluid Flow through Random State Porous Media by the SPH Method		
2016.9	Smoothed Particle Hydrodynamics Method for 2D Rayleigh-Taylor Instability Simulation		
2016.3	On Cubic Multivariate Public Key Cryptosystems		
2016.3	A shape deformation model in the pressurization process and its mathematics analysis		
2016.3	The graphs with maximum and minimum sizes for any order and chromatic number		
2016.3	Mathematical analysis of polygonal motion with singularities and application to the snow crystal growth		
2016.3	On Pfaffian systems of hypergeometric functions with two variables		
2016.3	A characterization of the graphs to induce periodic Grover-walk		
2016.3	Analysis on a heat transfer model of metal layer manufacturing		
2015.9	Energy-Theoretic Crack Propagation based on a Localized Francfort-Marigo Model and Comparison with a Phase Field Model		

2015.9	Development of a Coupling Model for Ocean Wave Simulation
2015.9	Simulation of the motion of a droplet on a plane by the discrete Morse flow method
2015.9	Simulation of triple line dynamics with arbitrary surface tensions
2015.9	Simulation of the fluid flow through an elastic porous medium by a three-dimensional SPH method
2015.9	Simulation of a soap film in the axially symmetric case using the acceleration dependent BMO scheme
2015.9	Shape Optimization Approach to a Free Boundary Problem using Traction Method
2015.9	Computing general error locator polynomial of 3-error-correcting BCH codes via syndrome varieties using minimal polynomial
2015.9	Bubble motion simulation using the acceleration dependent BMO scheme
2015.3	Spectral analysis of extended friendship graph
2015.3	Discrete eigenvalues and a special solution of discrete Laplacian
2015.3	Development of methods to recover low-dimensional information lost due to degradation of image sequences
2015.3	Numerical solution by particle and finite difference methods of a coupled model in fluid dynamics
2015.3	Simulation of wave propagation by shallow-water and Navier-Stokes equations
2014.9	Lattice Boltzmann method for ocean wave propagation
2014.9	On the tunneling energy and the phase factor of a discrete Schrödinger equation for one-dimensional particle with uniform junction potential
2014.9	On A, E, and D-local optimalities and a construction of a sequence of isospectral graphs
2014.9	Construction of a weak solution to a hyperbolic free boundary problem
2014.9	Half thickness of a tilted accretion disk in black hole binaries
2014.9	Simulation of a one-dimensional compressible flow governed by a polytropic process
2014.9	Ocean wave simulation using a three-dimensional SPH method with stochastic energy recovery
2014.3	Mathematical analysis of skin dysesthesia phenomena by modeling of peripheral nerve growth
2014.3	Mathematical analysis for Interkinetic Nuclear Migration by cellular nucleus motion model
2014.3	Development of numerical methods for solving 3-dimensional mean curvature flow with volume constraint
2014.3	Mathematical analysis for the collective motion of camphor disks
2014.3	A BCH decoding algorithm using the Groebner bases of a polynomial ideal
2014.3	On three dimensional dam break simulation using smoothed particle hydrodynamics method with Riemann solver
2013.9	Mathematical and numerical treatment for multi-shout options pricing
2013.9	Simple boundary particle detection in two and three dimensional SPH simulation
2013.9	Smoothed particle hydrodynamics using Riemann solver for 3D dam break simulation
2013.9	Three-dimensional simulation of droplet motion using smoothed particle hydrodynamics method
2013.9	Metal casting simulation using smoothed particle hydrodynamics
2013.9	Three-dimensional smoothed particle hydrodynamics method for simulating free surface flows
2013.3	Homeostasis estimation of the epidermal structure model
2013.3	Chandle oscillator modeling and its mathematical analysis
2013.3	Eigenvalues of discrete Laplacian with edge-interactions
2013.3	Singularities of an one-dimensional quantum system with conjunction
2013.3	Development of numerical scheme for multi-shout options
2012.9	The Fourier expansion method for determining indicators of an IT company's stock
2012.9	A numerical method for pricing shout options via discrete Morse flow
2012.9	Phase transition simulation using the moving particle semi-implicit method
2012.9	Numerical simulation of droplet motion on an inclined plane
2012.9	The smoothed particle hydrodynamics method for two-dimensional Stefan problem
2012.9	Simulation of solid to liquid phase transitions using smoothed particle hydrodynamics models
Recent Doctoral theses in these 3 years (+ more if appropriate)	
year.month	Thesis title (including English translation of Japanese thesis title)
2015.9	Bank Lending Strategy in The Stock Market
2015.9	Comparison of numerical methods for 1-D hyperbolic-type problems with free boundary
2015.3	Mathematical analysis of a ball bouncing problem by using discrete Morse flow
2014.9	Numerical analysis of multiphase curvature-driven interface evolution with volume constraint
2014.9	Simulation of triple line dynamics by interface-fluid coupling
2013.9	Study of a constrained hyperbolic free boundary problem involving fluid motion based on variational approach and particle method

2013.3	Spontaneous motion of a surfactant particle at the air–water interface
2013.3	A numerical method for image processing and its applications
2013.3	Development of an index expansion method for portfolio analysis
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