Research Institute for Mathematical Sciences
2017-2018

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Research Institute for Mathematical Sciences (RIMS) was established in 1963 as a cooperative research institute affiliated to Kyoto University for the purpose of accelerating research in mathematical sciences. The aim of RIMS is to promote fundamental research in the mathematical sciences. In order to achieve this, RIMS functions in three ways, namely as a research institute, as a graduate school and as a research center for cooperative research. RIMS provides services for the convenience of cooperative research projects widely throughout Japan and the world, along with research activities and postgraduate education in mathematical sciences.

Mathematics is related to a great number of sciences and technologies, playing an essential role in supporting the human world as we know it today. A wide range of fields in mathematics, such as algebra, geometry and analysis, have been contributed to various aspects of our civilization, including communication networks, financial systems, traffic and transportation systems, electronic and medical communication networks, financial systems, traffic and transportation systems, electronic and medical equipment and household appliances. Further, in addition to such engineering technologies, mathematics provides powerful tools in understanding and describing the workings of life, the mechanism of the universe, and even social science phenomena. In the 21st century, the development of computers and networks, and accumulation of massive data require higher applications of mathematics in creating, underpinning and realizing new ideas.

However, increasing demand in application fields is not the only reason for the development of mathematics. There are many examples of theories which were created purely from mathematical perceptions and are widely applied for practical purposes today. The theory on field extension created by Galois in the beginning of the 19th century, now supports the various codes of modern network communications. Non-Euclidean geometry, which was regarded as a heresy thought in the 19th century, gave birth to present-day GPS technology through the theory of general relativity. The spectral theory of partial differential operators in 19th century set the stage for quantum mechanics in the 20th century, and the topological group theory in the early 20th century led to modern methods of data and image analysis. Research in pure mathematics leads through long ways to vast range of applications, because pure mathematics is able to drastically change one’s perspectives and establish a deep universality and integrity of mathematics. The relationship between applied mathematics and pure mathematics are like that between the many leafy branches and the deep roots of one tree, which influence each other and their mutual interaction is indispensable for further development of mathematics.

Since its foundation half a century ago, RIMS has served as a comprehensive institute for both mathematics and mathematical sciences for half a century, now with around 40 faculty members (12 professors) and more than 10 post-doctoral fellows, nearly two thirds of which is for pure mathematics, and the rest for applied mathematics including optimization theory, mathematical physics, fluid dynamics and theoretical computer sciences. RIMS consists of three major divisions of basic mathematical sciences, infinite analysis and applied mathematical sciences, together with the Computer Laboratory. Also, Research Center for Quantum Geometry (since 2012), Mathematics Coordination Center (since 2013) and Preparatory Center for Research in Next-Generation Geometry have been established in order to reinforce research to create new geometry as well as to promote mathematical innovations through collaborations with a wide range of scientific fields.

RIMS makes efforts to create and keep better research environment, and the activities of RIMS members are highly appreciated in the world, which is endorsed by the awarding of two Fields medals, a Gauss medal and two Wolf prizes to current and emeritus members of RIMS. In addition, RIMS has a graduate school for mathematics and mathematical sciences together with the Division of Mathematical Sciences of Kyoto University. Also, since its establishment, RIMS has been serving as an institute to host joint cooperative researches in mathematical sciences for researchers from all over Japan and the world. Since 2010 RIMS is certified as a Joint Usage/Research Center (JU/RC) by the Ministry of Education, Culture, Sports, Science and Technology, Japan. Now every year, as JU/RC, RIMS hosts around 80 RIMS Workshops in mathematics and mathematical sciences with more than 4000 participants, among which more than 300 participants are from abroad to make short- and long-term visits for international cooperative research. Another JU/RC program which RIMS conducts is the International Project Researches which are held every year on specific mathematical themes consisting of several workshops and conferences. In the third Medium-Term Plan of Kyoto University starting in 2016, RIMS begins international recruitment for RIMS Workshops aiming at further promotion of international cooperative researches, and plans to extend the international recruitment to other JU/RC programs. RIMS is making efforts to contribute to further developments in mathematics and mathematical sciences in the 21st century.

Message from the Director

Michio Yamada
What is Mathematical Science?

Many problems raised in academic fields such as natural science and social science require mathematical approaches. Some of them cannot be resolved with existing mathematical methods, thereby demanding the development of new methods and creation of new theories. For instance, the development of calculus to solve problems in mechanics is a remarkable example in history. New such methods and theories originated in physics and engineering have gone behind the resolution of initial problems and have been reborn and developed as new general theories in mathematics, which have found applications in other fields. Mathematical Science is the field promoting such research.

Vision and Goal of Our Research

The mission of Research Institute for Mathematical Sciences (RIMS) is to serve as a center of international research in mathematics and mathematical science and reinforce its functions. The members of RIMS are conducting a wide range of research from fundamental to applications, whose research topics are closely interrelated and their interactions lead to creation of new research areas. RIMS is the only center in Japan for joint usage and joint research concerning mathematical sciences. The institute conducts collaboration activities including workshops and seminars and hosts about 4,000 researchers every year. As part of joint usage/research activities RIMS organizes international research projects on selected research themes for each year, which have yielded several research outputs and provided opportunities for young researchers. These joint usage/research activities, run by the Advisory Board in which external members hold a majority, are selected from publicly solicited proposals via objective assessment.

Publications of Research Results

Publications of the Research Institute for Mathematical Sciences is an internationally recognized periodical academic journal which receives many contributions from overseas. RIMS Kôkyûroku publishes the results of joint research/usage activities. Since 2007, RIMS publishes a new series of Lecture Notes called “Kôkyûroku Bessatsu”, which are special issues of RIMS Kôkyûroku. RIMS Letter is electronically distributed twice a year for promoting the publicity of activities at RIMS.

Since 1976 RIMS organize Introductory Public Lectures once a year, which introduces modern mathematics to general audience including high school students as well as senior citizens. The lecture notes of previous lectures are available from the RIMS web site.
Organization

Research Divisions
- Fundamental Mathematics Research Division
- Infinite Analysis Research Division
- Applied Mathematics Research Division

Attached Institutes
- Computer Laboratory
- Center for Research Interaction in Mathematical Sciences (Internal process)
- Research Center for Quantum Geometry (Internal process)
- Liaison Center in Mathematics (Internal process)

Administrative Office
- General Affairs Section
- Cooperative Research Service Section
- Library
- Secretariat (including the International Research Support Office)

Fields: Number theory, algebraic geometry, topology, algebraic analysis, computation mechanism theory, etc.

This division investigates the fundamentals of mathematics including the systems of numbers, structures of spaces and functions, and laws of computation and reasoning with the intention of promoting the development of mathematics and its applications in various ways and to provide them with solid research foundations.

Researchers

- Professor OHTSUKI, Tomotada (Topology)
- Professor ONO, Kaoru (Geometry/topology, and differential geometry)
- Professor MOCHIZUKI, Takuro (Differential geometry and algebraic geometry)
- Associate Professor NAKAYAMA, Noboru (Algebraic geometry)
- Associate Professor HABIRO, Kazuo (Topology)
- Associate Professor ARAKAWA, Tomoyuki (Algebraic/representation theory and vertex operator algebras)
- Associate Professor YAMASHITA, Go (Derived category)
- Associate Professor NAGATA, Masatsugu (Topology)
- Associate Professor KAWANOUE, Hiraku (Algebraic geometry)
- Associate Professor FUJITA, Kento (Algebraic geometry)

Category

<table>
<thead>
<tr>
<th>Professor</th>
<th>Associate Professor</th>
<th>Senior Lecturer</th>
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<th>Sub-Total</th>
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[*1] indicates the number of Program-Specific Assistant Professors included in the number of Assistant Professors. The numbers in [ ] are the numbers of domestic visiting professors and the numbers in ( ) are the number of overseas visiting professors, which are not included in the total.

As of April 1, 2017
Infinite Analysis Research Division

Fields: Infinite dimensional analysis, infinite symmetry, global analysis, geometric structure, probability structure, etc.

With the objective of analyzing systems with an infinite degree of freedom, which is an important research issue of mathematical science, this division pursues introducing developments in quantum physics and statistical physics, and at the same time providing them with systematic and accurate mathematical foundations.

Researchers

- Professor MUKAI, Shigeru (Algebraic geometry and vector bundle)
- Professor TAMAGAWA, Akio (Number theory and Arithmetic geometry)
- Professor MOCHIZUKI, Shinichi (Arithmetic geometry and anabelian geometry)
- Professor NAKAHI, Hiroki (Geometry and representation theory)
- Professor KUMAGAI, Takashi (Probability theory)
- Associate Professor KAWAI, Toshiya (Dynamical systems and mathematical physics)
- Associate Professor TAKEHIRO, Shin-ichi (Geophysical fluid dynamics)
- Associate Professor FUKUSHIMA, Ryoki (Probability theory)
- Associate Professor HOSHI, Yuichiro (Arithmetic geometry)
- Assistant Professor HELMKE, Stefan (Algebraic geometry)
- Assistant Professor OOURA, Takuya (Numerical analysis)
- Assistant Professor YOKOTA, Takumi (Differential geometry)
- Assistant Professor KOSHIKAWA, Teruhisa (Number theory and Arithmetic geometry)

Applied Mathematics Research Division

Fields: Theory of differential equations, mathematical physics, discrete systems, large-scale calculation, complex systems, etc.

Through interaction with natural science, engineering, social science, and other scientific fields involving mathematics, this division aims to return the results of research back to these fields for their development by investigating the mathematical issues found in the fields.

Researchers

- Professor YAMADA, Michio (Fluid mechanics and wavelet analysis)
- Professor HASEGAWA, Masahito (Theoretical computer science and software science)
- Professor OZAWA, Narutaka (Theory of operator algebras and theory of discrete group)
- Professor MAKINO, Kazunisi (Discrete mathematics, optimization, and theory of algorithms)
- Associate Professor SAITO, Morihiko (Algebraic analysis)
- Associate Professor IRIE, Kei (Geometric representation theory)
- Assistant Professor ISONO, Yusuke (Theory of operator algebras)
- Senior Lecturer KISHIMOTO, Nobu (Nonlinear partial differential equations)
- Senior Lecturer TAN, Fucheng (Arithmetic geometry and Galois representations)
- Assistant Professor HIKITA, Tatsuyuki (Geometric representation theory)
- Program-Specific Assistant Professor ISONO, Yusuke (Theory of operator algebras)
- Associate Professor KAWARETA, Masayuki (Algebraic geometry)
- Associate Professor KAWAKITA, Masayuki (Algebraic geometry)
- Associate Professor KAWAKITA, Masayuki (Algebraic geometry)
- Senior Lecturer TAN, Fucheng (Arithmetic geometry and Galois representations)
- Assistant Professor IRIE, Kei (Geometric representation theory)
- Assistant Professor ISONO, Yusuke (Theory of operator algebras)
- Program-Specific Assistant Professor ISONO, Yusuke (Theory of operator algebras)
- Associate Professor KAWARETA, Masayuki (Algebraic geometry)
Research Institute for Mathematical Sciences, Kyoto University

**Computer Laboratory**

This laboratory is conducting research and development of advanced software technology based on theoretical results.

**Researchers**

- Director (joint appointment) HASEGAWA, Masahito (Theoretical computer science and software science)
- Associate Professor TERUI, Kazushige (Mathematical logic and theoretical computer science)
- Assistant Professor HOSHINO, Naohiko (Theoretical computer science)

The computer system of the institute, used not only by the members of the institute but also by many visitors and collaborators, is administered and maintained by dedicated technical staff, and is quite stable and reliable. The high-speed computer for scientific calculation installed at this institute is a parallel computer with 18 nodes and 216 cores. It is used to solve problems in applied mathematics including fluid mechanics and has been producing new results one after another. (Figure 1 shows two-dimensional turbulence.) High-performance workstations are also used to conduct basic research in computer science, which has resulted in new theories on computation and leading-edge software based on those theories. (Figure 2 illustrates the implementation of a program using the geometry of interaction.)

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**Center for Research Interaction in Mathematical Sciences**

For the purpose of promoting research exchange between excellent researchers from inside and outside Japan by providing them with an environment for collaborative research, this faculty was established based on the former Center for Research in the Frontiers of Mathematical Science in April 2012. The project faculty members, both paid and unpaid, conduct research in cooperation with the members of RIMS during a term of 2 to 3 months to 5 years in a research environment similar to those of the members of RIMS.

**Researchers**

- Project Professor FUJISHIGE, Satoru
- Project Professor FUJIKI, Akira
- Project Professor IWAMA, Kazuo
- Project Professor KIRILLOV, Anatoli
- Project Assistant Professor SUZUKI, Kazuo
- Project Assistant Professor ISHIHOTO, Kenta
- Project Assistant Professor SUZUKI, Sakie
- Project Assistant Professor ISHIHOTO, Yutaka

**Research Center for Quantum Geometry**

With the intention of accelerating research in quantum geometry, a new field of mathematics, this research center was founded in April 2012. It aims at significant progresses in the study of quantum geometry through collaborative research by domestic and overseas researchers.

**Researchers**

- Director (joint appointment) NAKAJIMA, Hiraku (Geometry and representation theory)
- Professor MOCHIZUKI, Takuro (Algebraic geometry and arithmetic geometry)
- Project Professor KASHIWARA, Masaki (Algebra and analysis)
- Project Professor MORI, Shigefumi (Algebraic geometry)
- Project Assistant Professor SHIMIZU, Tatsuro (Topology)
- Project Assistant Professor YOSHIDA, Yutaka (Mathematical physics)
- Project Assistant Professor SANNAI, Akiyoshi

**Liaison Center in Mathematics**

For the purpose of conducting collaborative research with researchers from other academic fields and with companies, this center was founded in May 2013. Its mission is the application of mathematics.

**Researchers**

- Director (joint appointment) YAMADA, Michio
- Project Professor KOKUBU, Hiroshi
- Project Professor SAKAIKO, Takashi
- Project Professor MATSUDA, Fumihiko
- Project Professor YAMADA, Ryo
- Project Assistant Professor YAMADA, Michio
- Project Assistant Professor KUMAGAI, Takashi
- Project Assistant Professor KUMAGAI, Takashi
- Project Assistant Professor MAKINO, Kazuhisa
- Project Assistant Professor MAKINO, Kazuhisa
- Project Assistant Professor MAKINO, Kazuhisa
- Project Assistant Professor HABIRU, Kazuo
- Project Assistant Professor YAMADA, Michio

For the purpose of fostering young researchers for the next generation, this center employs program-specific non-tenured faculty members who will work with specific programs and projects as shown below.

**Projects**

1. **Creation of new geometry that enhances the capability of research in cutting-edge mathematics**
   - Establishment of a leading role in mathematics
   - Program-Specific Assistant Professor SHIMIZU, Tatsuro (May 16, 2014 to March 31, 2018)

2. **New deployment of algebraic geometry from the viewpoint of mathematical physics**
   - Program-Specific Assistant Professor YOSHIDA, Yutaka (November 1, 2016 to March 31, 2018)

3. **Mathematics of the moduli spaces of algebraic varieties and self maps**
   - Program-Specific Assistant Professor SANNAI, Akiyoshi (April 1, 2017 to March 31, 2018)
To promote mathematical science research in Japan, this institute is serving as a Joint Usage/Research Center that provides researchers nationwide in the related fields with opportunities and assistance for various joint usage. Joint usage research plans are publicly solicited once a year. The proposals are reviewed and adopted by the technical committee and advisory board. In addition, important and urgent plans that are drawn up when excellent researchers come from overseas, considerations are given so that they will be implemented efficiently as special plans.

### RIMS and Joint Usage/Research Center

- **Results of the Joint Usage Research**
  - 800 to 1,000 papers/year
- **Promotion of Long-Stay Collaborative Research**
  - 198 universities
  - 16 private organizations
  - 238 overseas organizations, etc.
- **Joint Usage/Research Center**
- **Project Research**
  - RIMS Gasshuku-style Seminars
  - RIMS Joint Research (Open)
  - RIMS Joint Research (Group)
  - Long-term researchers

### Form of Joint Use Research

- **RIMS Joint Research (Open)**
  - Open joint research on a specific theme is conducted for several days at this institute. The research program will be distributed to the organizations concerned beforehand. The program will be posted on the Web site of this institute: http://www.kurims.kyoto-u.ac.jp/~kyodo/workshop-ja.html

- **RIMS Joint Research (Group)**
  - A group of two or more researchers will conduct research as joint use researchers for 1 to 2 weeks at this institute.

- **RIMS Gasshuku-style Seminars**
  - This is a workshop where researchers from inside and outside Japan can gather and discuss under the same roof. Its purpose is to contribute to a quantum leap in each field of research and the development of next-generation leaders. (This project started in 2008, and since 2016, international recruitment has been performed as part of the internationalization of the center activities.)

- **Long-term researchers**
  - These researchers conduct research as joint usage researchers for two weeks or more at this institute. One of the important purposes is to exchange opinions with nearby researchers.

### Implementation of Joint Usage Research

![Implementation of Joint Usage Research](chart)

- **Number of Participants**
- **Number of Joint Usage Research Projects**
- **Number of Participants**: Approximately four times higher than shown in the chart

### Results of Joint Usage Research

Many of the results of joint usage research will be assembled in papers and included in RIMS Kôkyûroku and RIMS Kôkyûroku Bessatsu (see the section on publications) issued by RIMS, as well as published in domestic and overseas academic journals.

![Seminar Camp Photos](Image)
As a collaborative research activity unique to RIMS, since 1991 the institute organizes international research projects on selected themes in mathematics and mathematical sciences every year. For each research project, various research activities, including international workshops and activities for fostering young researchers, are inductively conducted for one fiscal year. Many overseas researchers participate in these research projects, including leading researchers invited as the key members of the projects.

### International Research Projects

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Research Theme</th>
<th>Number of Participants</th>
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<tr>
<td>Fiscal 2002</td>
<td>Stochastic Analysis and Related Topics</td>
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<tr>
<td>Fiscal 2003</td>
<td>Complex dynamics</td>
<td>280</td>
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<tr>
<td>Fiscal 2004</td>
<td>Method of Algebraic Analysis in Integrable Systems</td>
<td>247</td>
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<tr>
<td>Fiscal 2005</td>
<td>Mathematics of the Navier-Stokes Equations and its Applications</td>
<td>468</td>
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<td>Fiscal 2006</td>
<td>Arithmetic Algebraic Geometry</td>
<td>213</td>
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<tr>
<td>Fiscal 2007</td>
<td>Theoretical Effectivity and Practical Effectivity of Gröbner Bases</td>
<td>288</td>
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<tr>
<td>Fiscal 2008</td>
<td>Mirror Symmetry and Topological Field Theory</td>
<td>286</td>
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<tr>
<td>Fiscal 2009</td>
<td>Discrete Structures and Algorithms</td>
<td>378</td>
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<tr>
<td>Fiscal 2010</td>
<td>On the Resolution of Singularities</td>
<td>101</td>
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<td>Fiscal 2011</td>
<td>Mathematical Finance</td>
<td>253</td>
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<tr>
<td>Fiscal 2012</td>
<td>Qualitative Study on Nonlinear Partial Differential Equations of Dispersive Type</td>
<td>127</td>
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<tr>
<td>Fiscal 2013</td>
<td>Perspectives in Deformation Quantization and Noncommutative Geometry</td>
<td>250</td>
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<tr>
<td>Fiscal 2014</td>
<td>Functions in Number Theory and their Probabilistic Aspects</td>
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<td>Fiscal 2015</td>
<td>Operator Algebras and their Applications</td>
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<td>Fiscal 2016</td>
<td>Minimal models and extremal rays</td>
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<td>Emerging Applications of Highly Accurate Method of Numerical Computation</td>
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<td>Fiscal 2020</td>
<td>Dynamical Systems: New Directions in Theory and Applications</td>
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<td>Fiscal 2021</td>
<td>Toward a new fusion research of mathematics and materials science</td>
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<td>Fiscal 2022</td>
<td>Geometric Representation Theory</td>
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<td>Stochastic Analysis</td>
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<td>Fiscal 2024</td>
<td>New Frontiers in Theoretical Computer Science</td>
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<td>Fiscal 2025</td>
<td>Fluid Dynamics of Near-Wall Turbulence</td>
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<td>Fiscal 2026</td>
<td>The prospects for Gröbner bases</td>
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<td>Fiscal 2027</td>
<td>Differential geometry and geometric analysis</td>
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<td>Fiscal 2028</td>
<td>Mathematical Analysis of quantum mechanics and related topics</td>
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<tr>
<td>Fiscal 2029</td>
<td>Vertex operator algebras and symmetries</td>
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### International Exchange

#### RIMS as a Center for International Joint Research

As the largest center of international joint research in the field of mathematical science in Japan, prominent researchers from overseas come and stay at this institute. It serves as a place for domestic and overseas researchers to conduct collaborative research. Its activities have earned international acclaim including a comment in the Notice of the AMS, 2004, “RIMS, an Institute for Japan and the World.”

Specific activities include receiving researchers of mathematical science from overseas universities and research institutions as visiting professors or guest scholars invited to Kyoto University, guest research associates, or short-stay visiting research scholars. These guest scholars stay for around a week to half year and are received in various forms. Three hundred or more researchers are received every year including the overseas researchers coming to conduct joint usage research. The institute also actively accepts foreign students.

Inviting overseas researchers, on which the institute concentrates its efforts, is expected to promote interactions with domestic researchers through international joint research by systematic coordination with joint usage research such as international symposiums (held around 10 times every year as part of a joint usage research project) in which many overseas researchers participate. In recent years, proposals for joint usage research projects have been solicited internationally to encourage further internationalization of the center activities to promote stay-type joint research.

#### Number of Visitors from Overseas

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</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
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<td>56</td>
<td>71</td>
<td>72</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>27</td>
<td>16</td>
<td>15</td>
<td>18</td>
<td>26</td>
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<td>Italy</td>
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<td>5</td>
<td>8</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>India</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Australia</td>
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<td>Canada</td>
<td>7</td>
<td>10</td>
<td>7</td>
<td>5</td>
<td>10</td>
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<tr>
<td>South Korea</td>
<td>32</td>
<td>45</td>
<td>31</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td>Sweden</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td>19</td>
<td>20</td>
<td>18</td>
<td>44</td>
<td>33</td>
</tr>
<tr>
<td>Denmark</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>19</td>
<td>11</td>
<td>22</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>France</td>
<td>40</td>
<td>37</td>
<td>38</td>
<td>28</td>
<td>32</td>
</tr>
<tr>
<td>Russia</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Others</td>
<td>93</td>
<td>87</td>
<td>76</td>
<td>80</td>
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<tr>
<td>Total</td>
<td>332</td>
<td>315</td>
<td>263</td>
<td>339</td>
<td>341</td>
</tr>
</tbody>
</table>

#### Changes in Overseas Visitors

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Visitors</td>
<td>461</td>
<td>315</td>
<td>341</td>
<td>348</td>
<td>332</td>
<td>335</td>
<td>283</td>
<td>322</td>
<td>339</td>
<td>341</td>
</tr>
</tbody>
</table>
Visiting Professors

Due to the major divisional change in April 1999, the position of overseas visiting professor was provided in each of the three major research divisions. Researchers from each field of mathematical science invited from overseas stay for a long time through the year and conduct joint research with domestic researchers.

Name (University)  Tenure
MANNEVILLE, Paul (École polytechnique)  2016. 4. 1 – 2016. 7. 3
MATHIEU, Pierre (Université d’Au-Marseille)  2016. 4. 8 – 2016. 7. 10
MATHUKI, Kerui (Purdue University)  2016. 5. 31 – 2016. 8. 15
OHKIMI, Kenji (The University of Sheffield)  2016. 5. 30 – 2016. 8. 31
SAIKE, Mohamed (University of Fessey)  2016. 6. 29 – 2016. 9. 29
WILLIAMSON, Gourda (Max Planck Institute for Mathematics)  2016. 9. 1 – 2016. 12. 15
LEE, Yongnam (Korea Advanced Institute of Science and Technology)  2016. 5. 8 – 2016. 12. 15
DOUGLAS, Craig Carl (University of Wyoming)  2017. 6 – 2017. 4. 3

Distinguished Visiting Professors

As part of the efforts for assisting the Top Global University Project at Kyoto University, professors with high international reputations including Fields Medal winners are received as distinguished visiting professors. They conduct research and teach students with the staff of Kyoto University, as well as participate in a wide range of education including special lectures.

Name (University)  Tenure
DOUGLAS, Craig Carl (University of Wyoming)  2017. 1. 6 – 2017. 4. 3
MICHALEK, Mateusz (Polish Academy of Sciences)  2016. 5. 8 – 2016. 10. 1
WILLIAMSON, Geordie (Max Planck Institute for Mathematics)  2016. 4. 25 – 2016. 8. 31

Academic Exchange Agreements

As part of the activities of the center of international research, the following academic exchange agreements have been concluded for the purpose of promoting and developing research collaborations in the fields of mathematical science.

Target Organization  Country  Date of Conclusion
International Institute for Advanced Studies  Japan  April 1, 1997
Korea Institute for Advanced Study (KIAS)  South Korea  March 10, 2000
Department of Mathematical Sciences, Seoul National University (SNU)  South Korea  June 23, 2006
Osaka City University Advanced Mathematical Institute  Japan  March 5, 2007
Pacific Institute for the Mathematical Sciences (PIMS)  Canada  March 30, 2009
National Institute for Mathematical Sciences (NIMS)  South Korea  June 24, 2010
Hausdorff Center for Mathematics, University of Bonn (HCM)  Germany  February 14, 2011
Tohoku University Advanced Institute for Materials Research  Japan  November 1, 2012
The CAU Nonlinear PDE Center, Chung-Ang University  South Korea  June 4, 2013
National Center for Theoretical Sciences (NCTS)  Taiwan  July 23, 2014
College of Science, University of Utah  United States  October 13, 2016
Higher School of Economics, National Research University  Russian Federation  June 2, 2017

Graduate Education and Conferment of Degrees

This institute aims to develop unique young researchers who belong to the Department of Mathematical Sciences of the Division of Mathematics and Mathematical Sciences in the Graduate School of Science, Kyoto University. In connection with this, the institute implemented the 21th Century COE Program, Formation of an International Center of Excellence in the Frontiers of Mathematics and Fostering of Researchers in Future Generations and the Global COE Program, Fostering Top Leaders in Mathematics—Broadening the Core and Exploring New Ground in the past. Currently, as the Mathematics Unit of the Kyoto University Top Global University Project “Japan Gateway Program”, it provides the graduate students with an international research environment including teaching by top-class overseas researchers. These projects are jointly run by the Division of Mathematics and Mathematical Sciences in the Graduate School of Science and RIMS.

Number of Students

The numbers of students on the Department of Mathematical Sciences are as listed below.

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Master's Program</th>
<th>Doctoral Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal 2013</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Fiscal 2014</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>Fiscal 2015</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>Fiscal 2016</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Fiscal 2017</td>
<td>20</td>
<td>23</td>
</tr>
</tbody>
</table>

As of April 1 for all fiscal years

Conferment of Degrees

The number of students in the Department of Mathematical Sciences who received a Ph.D. (in science) from Kyoto University (since 1994) is listed below.

<table>
<thead>
<tr>
<th>Doctoral Course</th>
<th>Doctoral Dissertation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>114</td>
<td>11</td>
<td>165</td>
</tr>
</tbody>
</table>

As of April 1, 2017

Awards Received by Graduate Students

Recently, graduate students in the Department of Mathematical Sciences have received the following prizes.

February 2012  SUZUKI, Sakic  4th Kyoto University Tachibana Award for Outstanding Woman Researchers
March 2013  ISHIMOTO, Kentta  FY 2013 Kyoto University President’s Award
September 2014  ISHIMOTO, Kentta  Fiscal 2013 Award for Outstanding Paper in Fluid Mechanics (jointly with Professor Yamada while undertaking a doctoral course)
December 2015  ISHIDA, Yawara  CANDAR 2015 Graph Golf Competition “Deepest Improvement Award”

Career after Completing Graduate School Program

Most students work as researchers at universities and companies.

Career after Graduate School Master’s Program

(Fiscal 1995 to 2016)

Career after Graduate School Doctoral Program

(Fiscal 1995 to 2016)
In addition to the research results of the full-time researchers, Publications of RIMS, which has been issued every year since 1965, is a journal for releasing important results concerning mathematical science in English. Papers that were published five years or more ago are freely available on the Web site of the European Mathematical Society. Some of these papers are also available on J-STAGE of the Japan Science and Technology Agency and the Web site of RIMS. RIMS Preprint, which releases the results of research by the full-time researchers before printing and publishing, is publicized on the Web site of RIMS. About 30 issues are released every year.

In addition, as the records for lectures concerning joint usage research, around 50 to 60 issues of RIMS Kôkyûroku are released every year. For the records of the workshops specially selected by the Advisory Board, RIMS Kôkyûroku Bessatsu is issued. Papers having no copyright problems are publicized on the Web site of RIMS and the research information repository of Kyoto University. RIMS Kôkyûroku Bessatsu has been published successively since April 2009.

Library Web Site
http://www.kurims.kyoto-u.ac.jp/~library/Home.html

<table>
<thead>
<tr>
<th>Number of Books</th>
<th>Foreign books</th>
<th>95,034</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Japanese books</td>
<td>7,841</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>102,875</td>
</tr>
</tbody>
</table>

Foreign journals 1,465
Japanese journals 132
Total: 1,597
As of April 1, 2017

European Mathematical Society

Electronic archive site of the Japan Science and Technology Agency
https://www.jstage.jst.go.jp/browse/kyotoms1969

National Institute of Informatics
http://www.nii.ac.jp/sparc/partners/#7

RIMS
http://www.kurims.kyoto-u.ac.jp/~prims/index.html
http://www.kurims.kyoto-u.ac.jp/preprint/index.html
http://www.kurims.kyoto-u.ac.jp/~kyodo/kokyuroku/kokyuroku.html

Kyoto University Research Information Repository
http://hdl.handle.net/2433/24849

Publications

<table>
<thead>
<tr>
<th>Publications of RIMS (Quarterly)</th>
<th>The latest issue is vol. 53, No. 1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIMS Kôkyûroku Bessatsu</td>
<td>The latest issue is No. 59.</td>
</tr>
<tr>
<td>RIMS Kôkyûroku</td>
<td>The latest issue is No. 2018.</td>
</tr>
<tr>
<td>RIMS Preprint</td>
<td>The latest issue is No. 1870. (Only electronic version has been issued since August 2013.)</td>
</tr>
</tbody>
</table>

As of April 1, 2017
Introductory Public Lecture

Introductory Public Lecture has been held almost every summer since 1976, featuring around three topics based on the results of mathematical science research selected from various aspects.

**Fiscal Year** | **Count** | **Topic** | **Number of Students**
--- | --- | --- | ---
Fiscal 2011 | 33rd | (1) Irregular singular points of a differential equation (2) Markov chain and mixing time – Mathematics of card shuffling (3) Introduction to the resolution of singular points | 93
Fiscal 2012 | 34th | (1) Infinite symmetry (2) Rigidity of graphs and materials (3) Two-dimensional geometric group theory common to number fields and topological surfaces | 86
Fiscal 2013 | 35th | (1) Untyped lambda calculus and models (2) Mathematics of crushed ice (3) Morse theory and Floer theory | 85
Fiscal 2014 | 36th | (1) Reconstruction of the additive structure with multiplicative information (2) Billiards to symplectic topology (3) How to calculate more easily? – Design and analysis of algorithms | 108
Fiscal 2015 | 37th | (1) Poincaré conjecture and rich flow (2) Mathematics of the planetary dynamo theory – Why stars and planets have their magnetic fields? (3) Banach-Tarski paradox | 114
Fiscal 2016 | 38th | (1) Mathematics of knots (2) Semantics of programming languages and category theory (3) Solving differential equations | 121
Fiscal 2017 | 39th | (1) Prime number theorem and Riemann zeta function (2) Introduction to nonstandard analysis – Mathematics of hyperreal numbers and infinity (3) ADE generalization of quintuple product formulas – From the viewpoint of field theory | 110

**Expenses of the Institute**

--- | --- | --- | --- | --- | --- | --- | --- |
Management Expenses | 728,943 | 767,346 | 769,235 | 738,684 | 730,971 | 721,779 | 695,477 |
Breakdown Labor costs | 483,548 | 497,874 | 495,897 | 477,587 | 443,792 | 435,362 | 419,552 |
| Article costs | 245,395 | 269,472 | 273,338 | 261,097 | 287,179 | 286,417 | 275,925 |
Grants-in-Aid for Scientific Research | 85,772 | 87,285 | 101,100 | 116,790 | 121,468 | 131,842 | 142,138 |
Grants for Creating Research and Education Bases (Global COE Program) | 101,280 | 90,620 | 93,309 | 0 | 0 | 0 | 0 |
Grants for Creating Research and Education Bases (Grants for Excellent Graduates) | 0 | 0 | 5,050 | 8,320 | 0 | 0 | 0 |
Comissioned research/ commissioned projects | 10,863 | 2,500 | 0 | 315 | 749 | 1,586 | 8,190 |
Collaborative research | 0 | 0 | 3,033 | 12,482 | 3,936 | 2,032 |
Contributions | 1,000 | 1,100 | 4,937 | 4,772 | 3,472 | 3,974 | 1,000 |
Total | 927,668 | 948,851 | 971,631 | 871,914 | 869,182 | 863,117 | 848,837 |

*For the article costs, the university management expenses grants except for enhancing the function of national universities are charged. The external funds include the indirect expenses. The Grants for Creating Research and Education Bases is the coordinate allocation to RIMS. The Grants-in-Aid for Scientific Research and contributions are the amount received.