TANIGAWA, Yoshio — Associate Professor

**Office:** Rm 457 in Math. Bldg.

**Telephone:** +81 (0) 52–789–2428 (ext. 2428)

**E-mail:** tanigawa@math.nagoya-u.ac.jp

**Membership of academic societies:**
Mathematical Society of Japan

## Research Interest:

- Analytic Number Theory

## Research Summary:

In number theory, there are many interesting functions, e.g., Euler's totient function $\varphi(n)$, Möbius fundtion $\mu(n)$, divisor function $d(n)$, etc. They are called arithmetical functions. I am interested in the behaviour of these functions, especially in $d(n)$ and $r(n)$ (which is the number of representations of $n$ as a sum of two squres). These typical cases are called the Dirichlet divisor problem and the Gauss circle problem. Each value of these functins is very complicated, so the standard method is to make an average. Then the main object of the research is the behaviour of the error term of this average, for example, the upper bound or the mean square estimates.

In the case of Dirichlet divosr problem I studied, with X.-D. Cao, J. Furuya and W.-G. Zhai, the explicit formula of the Mellin-type integral of the error terms and its aplication to a certain kind of double zeta functions which cannot be handled by the usual method. I also studied the difference of the discrete sum and the integral. Recently I study these problems in the framework of the extended Selberg class.

Multiple zeta functions or values have been studied extensively since 1990's. The most important and typical one is Euler-Zagier type multiple zeta functions. I got a satisfactory upper bound for double zeta function. By using a new expression, I also studied several analytic properties.

Recently I am interested in the work of Ramanujan, in paricular in the theory of modular equation, the infinte series represenation of $1/\pi$. Here the Clausen identity on hypergeometric sereis plays an important role. My latest work (with H.H. Chan) in this direction is a generalization or analogue of Clausen's identity as a genralizaton of Brafman's identity on Legendre and Jacobi polynomials.

## Major Publications:

[1] J. Furuya, M. Minamide, Y. Tanigawa, Moment integral of $1/\sin t$ and related zeta-values, to appear in Ramanujan Journal.

[2] X. Cao, J. Furuya, Y. Tanigawa, W. Zhai, A generalized divisor problem and the sum of Chowla and Walum, Journal of Mathematical Analysis and Applications **400** (2013), 15–21.

[3] B.C. Berndt, H. H. Chan, Y. Tanigawa, Two Dirichlet sereis evaluations found on page 196 of Ramanujan's Lost Notebook, Math. Proc. Cambridge Phil. Soc. **153** (2012), 341–360.

[4] H.H.Chan, Y. Tanigawa, Y.F. Yang, W. Zudilin, New analogues of Clausen's identity arising from the theory of modular forms, Adv. Math. **228** (2011), 1294–1314.

[5] I. Kiuchi, Y. Tanigawa, W. Zhai, Analytic properties of double zeta functions, Indag. Math. **21** (2011), 16–29.

[6] J. Furuya, Y. Tanigawa, Explicit representations of the integral involving the error term of Dirichlet divisor problems, Acta Math. Hungarica **129** (2010), 24–46.

[7] J. Furuya, Y. Tanigawa, Analytic properties of Dirichlet series obtained from the error term in the Dirichlet divisor problem, Pacific J. Math. **245** (2010), 239–254.

[8] Y. Tanigawa, W. Zhai, Fourth power moments of $\Delta(x)$ and $E(x)$ for short intervals, International J. Number Theory, **5** (2009), 355–382.

[9] I. Kiuchi, Y. Tanigawa, Bounds for double zeta functions, Ann. Scoula Norm. Sup. Pisa, **V** (2006), 445–464.

[10] S. Kanemitsu, A. Sankaranarayanan, Y. Tanigawa, A mean value theorem for Dirichlet series and a general divisor problem, Monatshefte für Mathematik, **136** (2002), 17–34.

[11] S. Akiyama, Y. Tanigawa, Multiple zeta values at non-positive integers, The Ramanujan J. **5** (2001), 327–351.

[12] Number Theory: Tradition and Modernization (edited by W. Zhang and Y. Tanigawa) DEVM 15, Springer, 2006.


### Education and Appointments:

1976 Assistant, Nagoya University

1990 Lecturer, Nagoya University

1995 Associate Professor, Nagoya University

### Message to Prospective Students:

I think that analytic number theory is an interesting field of mathematics. I am in paticular interested in the mysterious connection between arithmetical functions and zeta functions. To shair this feelings with students I usually use the textbooks on the Riemann zeta function in my class. Through the proof of prime number theorem, mean velue theorem and other topics on the Riemann zeta functon, we can learn the fundamental tools in analytic number theory. I also consider that the theory of sieve method is very useful for young students.