Research activity

Published Papers

1)Kazuaki Tanaka, Kouta Sekine, Makoto Mizuguchi, and Shin'ichi Oishi, Sharp numerical inclusion of the best constant for embedding H^1_0(Ω)↪L^p(Ω) on bounded convex domain, Journal of Computational and Applied Mathematics, Vol. 311, pp. 306–313, Feb., 2017.

2)Katsuhisa Ozaki, Takeshi Ogita, and Shin'ichi Oishi, "Error-free transformation of matrix multiplication with a posteriori validation", Numerical Linear Algebra with Applications Vol. 23, No.5, pp. 931-946, Jul.,2016

3)Makoto Mizuguchi, Akitoshi Takayasu, Takayuki Kubo, and Shin'ichi Oishi, "On the embedding constant of the Sobolev type inequality for fractional derivatives", NOLTA, IEICE, Vol. 7, No. 3, pp. 386-394, Jul., 2016.

4)Akitoshi Takayasu, Makoto Mizuguchi, Takayuki Kubo, and Shin'ichi Oishi, Verified Computations for Solutions to Semilinear Parabolic Equations Using the Evolution Operator, Mathematical Aspects of Computer and Information Science, Springer Cham, Vol. 9582, pp. 218-223, 2016.

5)Naoya Yamanaka, Tomoaki Okayama, and Shin'ichi Oishi, Verified Error Bounds for the Real Gamma Function Using Double Exponential Formula over Semi-infinite Interval, Mathematical Aspects of Computer and Information Science, Springer Cham, Vol. 9582, pp.224-228, 2016.

Nonreviewed Papers

1)Kouta Sekine, Kazuaki Tanaka, and Shin'ichi Oishi, Computer assisted existence proof of solutions to system of partial differential equations with bounded convex polygonal domains (有界な凸領域における連立楕円型偏微分方程式の解の計算機援用存在証明法), Proceedings of the Twenty-Eighth RAMP Symposium, Niigata University, Niigata, October, 2016.

2)関根晃太, 田中一成, 大石 進一, ある無限次元固有値を用いた楕円型偏微分方程式の解の存在性に対する計算機援用証明法, RIMS Kôkyûroku No.2037, Numerical Analysis: New Developments for Elucidating Interdisciplinary Problems II, pp. 86-96, 2017(in japanese)

3)Kazuaki Tanaka, Kouta Sekine, and Shin'ichi Oishi, Numerical verification method for positivity of solutions to elliptic equations, RIMS Kôkyûroku No.2037, Numerical Analysis: New Developments for Elucidating Interdisciplinary Problems II, pp. 117-125, 2017.

Invited Talks

1)講演題目: 楕円型微分方程式の正値解に対する精度保証付き数値計算法(Verified numerical computation method for positive solutions to elliptic differential equations),
RIMS 研究集会「現象解明に向けた数値解析学の新展開 II」, 2016 年 10 月 19 日～10 月 21 日(in japanese).

2)講演題目: ある無限次元固有値を用いた楕円型偏微分方程式の解の存在性に対する計算機援用証明法(Computer-assisted proof for existence of solutions to PDEs using an infinite eigenvalue),
RIMS 研究集会「現象解明に向けた数値解析学の新展開 II, 2016 年 10 月 19 日～10 月 21 日(in japanese).

3)講演題目: 有界な凸領域における連立楕円型偏微分方程式の解の計算機援用存在証明法(Computer assisted existence proof of solutions to system of partial differential equations with bounded convex polygonal domains),

The Twenty-Eighth RAMP Symposium, 2016 年 10 月 13 日～10 月 14 日.

4)講演題目: Rigorous numerical inclusions of positive solutions to elliptic problems, International Workshop on Enclosure Methods, Freudenstadt, Germany, Sep. 22-23, 2016.

Talks

1)講演題目: Verified numerical integration for function with power-type singularity using partial integration,
INVA2017(The International Workshop on Numerical Verification and its Applications), HOTEL BREEZE BAY MARINA OKINAWA, Japan, (2017/3/18)

2)講演題目: A numerical verification method for solutions to systems of parabolic equations,
The International Workshop on Numerical Verification and its Applications (INVA2017), Miyako Island in Okinawa, (2017/3/17).

3)講演題目: Numerical method for estimating the best constant in Sobolev type inequality on unit square,
The International Workshop on Numerical Verification and its Applications (INVA2017), Miyako Island in Okinawa, (2017/3/17).

4)講演題目: Shifted CholeskyQR for Computing the factorization of ill-conditioned matrices,
The International Workshop on Numerical Verification and its Applications 2017, Miyako-jima, Mar.2017.

5)講演題目: 線形化問題の精度保証を利用した非線形楕円型境界値問題の精度保証結果の改善
日本応用数理学会 2016 年度連合発表会, 電気通信大学, 2017 年 3 月 6 日～7 日(in japanese).

6)講演題目: Verified numerical computation for stationary problem of Allen-Cahn equation,
the 53rd meeting of ANXIAM 2017, Hahndorf, South Australia, Feb. 5-9, 2017.

7)講演題目: Verified quadrature for integrand with power-type singularity using partial integral,
ANZIAM2017, The Adelaide Hills Convention Centre, Australia, (2017/2/6).

8)講演題目: Fast verification method for solving matrix equations by QR factorization,
ANZIAM2017, South Australia, Feb.2017

9)講演題目: 時間発展問題の精度保証付き数値計算に現れる誤差伝搬の縮小技術,
2016 年度応用数学合同研究集会, 龍谷大学 瀬田キャンパス (2016/12/15) (in japanese).

10)講演題目: 放物型方程式に対する解の精度保証付き数値計算法について,
SADO Workshop on Numerical Analysis and Related Topics, ホテルファミリー才佐渡相川 (2016/11/20) (in japanese).

11)講演題目: Computable norm bounds of the evolution operator using spectral properties,
The 35th JSST Annual Conference International Conference on Simulation Technology (JSST2016), Kyoto, Japan (2016/10/28).

12)講演題目: Improved Extraction Scheme for Accurate Floating-point Summation, The 35th JSST Annual Conference: International Conference on Simulation Technology, Kyoto University, Japan,Oct. 2016

13)講演題目: On verification methods for parabolic partial differential equations using the evolution operator,
the 17th International Symposium on Scientific Computing, Computer Arithmetics and Verified Numerics (SCAN 2016), Uppsala, Sweden (2016/9/28).

14)講演題目: A method of verified computation for convex programming, SCAN2016(The 17th International Symposium on Scientific Computing, Computer Arithmetics and Verified Numerics.), UPPSALA UNIVERSITY, Sweden, (2016/9/27).

15)講演題目: On verified numerical computation for positive solutions to elliptic boundary value problems,
Computer Arithmetic and Validated Numerics, SCAN2016, Sep. 26-29, 2016.

16)講演題目: A norm estimation for an inverse of linear operator using a minimal eigenvalue, Computer Arithmetic and Validated Numerics, SCAN2016, Sep. 26-29, 2016.

17)講演題目: Verified numerical computations for blow-up solutions of ODEs,
the 17th International Symposium on Scientific Computing, Computer Arithmetics and Verified Numerics (SCAN 2016), Uppsala, Sweden (2016/9/26).

18)講演題目: Verification method for linear systems via QR factorization,
the 17th International Symposium on Scientific Computing, Computer Arithmetics and Verified Numerics, Sweden, Sep.2016

19)講演題目: 高精度な総和計算アルゴリズムにおける無誤差変換の改良,
日本応用数理学会 2016 年度年会,北九州国際会議場,2016/09(in japanese)

20)講演題目: 部分積分と Euler-Maclaurin の公式を用いたベキ型特異点を持つ関数の精度保証付き数値積分,
日本応用数理学会 2016 年度年会, 北九州国際会議場 (2016/9/14) (in japanese).

21)講演題目: 精度保証付きドロネー三角形分割の計算手法に対する考察,
数学・数理科学専攻若手研究者のための異分野・異業種研究交流会 2016, 明治大学中野キャンパス, 2016 年 11 月 19 日(in japanese).

22)講演題目: Delaunay 三角形分割の精度保証付き数値計算手法に対する考察,
日本応用数理学会 2016 年度年会, 北九州国際会議場, 2016 年 9 月 12 日～9 月 14 日(in japanese).

23)講演題目: ハウスホルダーQR 分解を用いた連立一次方程式の数値解に対する精度保証法,
日本応用数理学会 2016 年度年会, 北九州国際会議場, 2016(in japanese)

24)講演題目: Computable estimates of the evolution operator based on the operator theory, Czech-Japanese-Polish Seminar in Applied Mathematics 2016 (CJPS 2016), Krakow, Polland (2016/9/8).

25)講演題目: Verification algorithm for enclosing a mild solution of semilinear heat equations, The fifth Asian conference on Nonlinear Analysis and Optimization (NAO-Asia 2016), Niigata, Japan (2016/8/2).

26)講演題目: Concatenation scheme for verified inclusion of solutions to semilinear heat equations,
The fifth Asian conference on Nonlinear Analysis and Optimization (NAO-Asia 2016), Niigata, Japan (2016/8/2).

27)講演題目: Estimation for optimal constant satisfying an inequality for linear operator using minimal eigenvalue,
The fifth Asian conference on Nonlinear Analysis and Optimization, Toki Messe, Niigata, Japan, August 1-6, 2016.

28)講演題目: On verified numerical computation for elliptic Dirichlet boundary value problems using sub- and super-solution method,
The fifth Asian conference on Nonlinear Analysis and Optimization, Toki Messe, Niigata, Japan, August 1-6, 2016.

29)講演題目: Rigorous numerics of blowup solutions for ODEs,
The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, July 1-5, 2016.

30)講演題目: Numerically verifiable condition for positivity of solution to elliptic equation,
The 11th East Asia SIAM. June, 20-22, 2016.

31)講演題目: Verified Computations for Solutions to Nonlinear Heat Equations Based on Fractional Powers of a Positive Operator and the Evolution Operator,
5th European Seminar on Computing (ESCO 2016), Pilsen, Czech Republic (2016/6/9).

32)講演題目: Improved Error Bounds for Large Linear Systems,
5th European Seminar on Computing,Pilsen,Czech, Jun. 2016

33)講演題目: H 行列を用いた精度保証付き数値計算法の改良と新しい誤差評価式の提案, 日本応用数理学会 第 12 回 研究部会連合発表会,神戸学院大学 ポートアイランドキャンパス, 2016/3/5(in japanese)

Research Outcome :

１）We developed a verified numerical integration strategy for functions with power-type singularity and a verified method for convex programming.

２）We proposed verification methods for large linear systems.

３）We proposed a method for the verification of positivity of solutions to elliptic equations.

４）We proposed an estimate for explicit values of the embedding constant from the spaces defined by the fractional power of Laplace operator to L^p space.

５）We presented an accurate and fast method using QR factorization.