

# CURRICULUM VITAE

May 15, 2012

**Name**            Hisa-aki SHINKAI, Dr.Sci.

## **Present position**

Associate Professor, Osaka Institute of Technology, Japan

## **Address**

Office:            Department of Information Science  
Osaka Institute of Technology  
Kitayama 1-79-1, Hirakata, Osaka 573-0196, Japan  
Phone/Fax: +81-(0)72-866-5393  
E-mail:            shinkai @ is.oit.ac.jp  
URL:                <http://www.is.oit.ac.jp/~shinkai/>

## **Education**

Undergraduate Course of Physics, Waseda University, Tokyo, Japan  
Attended from April 1986 to March 1990.  
B.Sci., Waseda University, March 1990.

Graduate School, Department of Physics, Waseda University, Japan  
Attended from April 1990 to March 1995.  
M.Sci., Waseda University, March 1992.  
Ph.D.Sci., Waseda University, March 1995.  
Ph.D. Supervisor – Kei-ichi Maeda.

## **Employment**

April 1994 – October 1996  
**Assistant Professor**, Department of Physics,  
Waseda University, Tokyo, Japan

November 1996 – August 1999  
**Postdoctoral Associate**,  
Department of Physics, Washington University, St. Louis, Missouri, USA  
(advisors: Prof. Clifford M. Will, Prof. Wai-Mo Suen)

September 1999 – August 2001  
**JSPS Research Fellow Abroad; Postdoctoral Scholar**  
(Japan Society for the Promotion of Science)  
Centre for Gravitational Physics and Geometry, Department of Physics,  
The Pennsylvania State University,  
University Park, Pennsylvania, USA  
(host: Prof. Abhay Ashtekar)

April 2001 – December 2003

**RIKEN Special Postdoctoral Researcher**

Computational Science Division,  
Institute of Physical and Chemical Research (RIKEN)  
Wako, Saitama, 351-0198 Japan  
(advisor: Dr. Toshikazu Ebisuzaki)

January 2004 – January 2006

**Senior Scientist**

Research Department, Inamori Foundation  
Simogyo-ku, Kyoto, 600-8411 Japan

January 2004 – present

**RIKEN Visiting Researcher**

Ebisuzaki Computational Astrophysics group,  
Institute of Physical and Chemical Research (RIKEN)  
Wako, Saitama, 351-0198 Japan

April 2006 – March 2012

**Associate Professor**

Department of Information Science, Osaka Institute of Technology  
Kitayama 1-79-1, Hirakata, Osaka 573-0196, Japan

April 2012 –

**Professor**

Department of Information Science, Osaka Institute of Technology  
Kitayama 1-79-1, Hirakata, Osaka 573-0196, Japan

**Position held (short period)**

July 1990 – September 1990

Fellow of International Association for Exchanging Students for Technical Experiences (IAESTE), visiting Delft University, The Netherlands

May and September 1993

Short-period Research Fellow at Yukawa Institute for Theoretical Physics,  
Kyoto University, Japan

October 2002

Visiting Associate in Physics in Division of Physics, Mathematics and Astronomy,  
California Institute of Technology, USA

September 2012 –

Part-time Lecturer, Mukogawa Woman's University, Hyogo, Japan

**Professional Affiliations**

Referee contributions for

*Physical Review Letters* (APS),  
*Physical Review D* (APS),

*Classical and Quantum Gravity* (IoP),  
*Journal of Physics: Conference Series* (IoP),  
*Progress for Theoretical Physics* (JPS),  
*Journal of Applied Physics Society Japan* (JAPS),  
 and *General Relativity and Gravitation* (GRG)

Member of *Physical Society of Japan*

*Astronomical Society of Japan*

*Japan Society for Industrial and Applied Mathematics*

*Institute of Physics* (UK)

*International Society on General Relativity and Gravitation*

*Rironkon* (Japanese Theoretical Astrophysicists)

*Soryushiron group* (Japanese Particle Physicists)

*Japan Society for Teaching and Popularization of Astronomy*

Editorial board of

*New book review* column in *Butsuri* journal (Physical Society of Japan), 2001-2003

### Awards

Okuma Memorial Scholarship at Waseda University

In 1986, 1987, 1989 and 1993. One student in the department is selected each year. Remission of all school fees.

### Funded

Grant-in-Aid for Scientific Research Fund of the Ministry of Education, Science, Sports and Culture No. 07854014 (1995)

1 M yen (~\$10K), for personal researches

Waseda University Grant for Special Research Projects (1995,1996)

750,000 yen (~\$7,500), for personal researches (1995)

400,000 yen (~ \$4,000), for personal researches (1996)

Grant-in-Aid for Scientific Research Fund of Japan Society for the Promotion of Science, No. 14740179 (2002)

3.5 M yen (~\$30K), for personal researches (2002/4-2005/3)

Osaka Institute of Technology Grant for Special Research Projects (2007)

500,000 yen (~\$4,500), for personal researches (2007)

Grant-in-Aid for Scientific Research Fund of Japan Society for the Promotion of Science, No. 22540293 (2010)

3.4 M yen (~\$37K), for personal researches (2010/4-2015/3)

### Personalia

Born: November 3, 1966, Tokyo, Japan

Family: Rika Shinkai (wife, married on Feb.29, 92),  
 Midori (daughter, born Nov. 3, 94), and Yuki (son, Sep. 21, 97)

## Research Interests in words

### General Relativity and Cosmology

Numerical Relativity: Formulations and Simulations  
Gravitational Waves, Relativistic Objects  
Relativistic Cosmology, Theories of Gravitation

## Research Interests [see Publications (articles)]

### General Relativity and Cosmology [related published papers]

#### General Relativistic Effects

Gravitational Radiation [7, 19, 27]

Gravitational Collapse [7, 35, 36]

#### Relativistic Stars

Neutron Stars [11]

Boson Stars [9, 10]

Black Holes [18, 19, 27]

Wormholes [23]

#### Cosmology

Inflationary Universe [2, 3, 5]

Higher dimensional models [15, 18, 26, 35, 36]

#### The Einstein equations

Exact solutions [4]

Characteristic formulations [4, 19]

Cannonical formulations [4, 6, 20, 21, 33]

Hyperbolic formulations [12, 13, 14, 16, 17, 20]

Asymptotically-constrained systems [17, 20, 21, 22, 24, 26, 32, 34, 37, 38]

Testbeds for numerical relativity [25, 32, 37]

#### Theory of gravitation:

Connection formulation [6, 8, 12, 13, 14, 16, 17, 33]

Scalar-Tensor theory [7, 9, 10]

Post-Newtonian approximation [11]

Higher dimensional equations [26, 33, 35]

#### Astrophysical Phenomena:

Gravitational Wave [27, 28, 29, 30, 31]

## PhD thesis

### NUMERICAL ANALYSIS OF INHOMOGENEOUS SPACETIME STRUCTURE

March 1995, Waseda University, Tokyo, Japan

Supervisor: Prof. Kei-ichi Maeda (Waseda Univ.)

Refereed by : Prof. Katsuhiko Sato (Tokyo Univ.),

Prof. Katsumi Yamada (Waseda Univ.),

Prof. Tsuneaki Daishido (Waseda Univ.)

and Prof. Ichiro Ohba (Waseda Univ.)

## LIST OF PUBLICATIONS

## Articles in Refereed Journals

1. Bistability in an Ising model with non-Hamiltonian dynamics  
with J.R.HERINGA, H.W.J.BLÖTE, A.HOOGLAND AND R.K.P.ZIA  
Physical Review **B 45** (1992) 5707-5709
2. Can gravitational waves prevent inflation?  
with K. MAEDA  
Physical Review **D 48** (1993) 3910-3913
3. Generality of inflation in a planar universe  
with K. MAEDA  
Physical Review **D 49** (1994) 6367-6378
4. A '3+1' method for finding principal null directions  
with L. GUNNARSEN AND K. MAEDA  
Class. Quant. Grav. **12** (1995) 133-140
5. Dynamics of topological defects and inflation  
with N. SAKAI, T. TACHIZAWA AND K. MAEDA  
Physical Review **D 53** (1996) 655-661
6. Constraints and reality conditions in the Ashtekar formulation of general relativity  
with G.YONEDA  
Class. Quant. Grav. **13** (1996) 783-790
7. Gravitational waves in Brans-Dicke theory : Analysis by test particles around a Kerr  
black hole  
with M. SAIJO AND K. MAEDA  
Physical Review **D 56** (1997) 785-797
8. Trick for passing degenerate metrics in the Ashtekar formulation  
with G. YONEDA AND A. NAKAMICHI  
Physical Review **D 56** (1997) 2086-2093
9. Generation of scalar-tensor gravity effects in equilibrium state boson stars  
with G.L. COMER  
Class. Quant. Grav. **15** (1998) 669-688
10. Dynamical evolution of boson stars in Brans-Dicke theory  
with J. BALAKRISHNA  
Physical Review **D 58** (1998) 044016 (13 pages)
11. Symmetric hyperbolic system in the Ashtekar formulation  
with G. YONEDA  
Physical Review Letters **82** (1999) 263-266

12. Truncated post-Newtonian neutron star model  
Physical Review **D 60** (1999) 067504 (4 pages)
13. Asymptotically constrained and real-valued system based on Ashtekar's variables  
with G. YONEDA  
Physical Review **D 60** (1999) 101502 (Rapid Communication, 5 pages)
14. Constructing hyperbolic systems in the Ashtekar formulation of general relativity  
with G. YONEDA  
Int. J. Mod. Phys. **D 9** (2000) 13-34
15. Fate of the Kaluza-Klein bubbles  
with T. SHIROMIZU  
Physical Review **D 62** (2000) 024010 (8 pages)
16. Hyperbolic formulations and numerical relativity: experiments using Ashtekar's connection variables  
with G. YONEDA  
Class. Quant. Grav. **17** (2000) 4799-4822
17. Hyperbolic formulations and numerical relativity II: Asymptotically constrained systems of Einstein equations  
with G. YONEDA  
Class. Quant. Grav. **18** (2001) 441-462
18. Charged brane world black holes  
with A. CHAMBLIN, H. S. REALL AND T. SHIROMIZU  
Physical Review **D 63** (2001) 064015 (11 pages)
19. Constraint propagation in the family of ADM systems  
with G. YONEDA,  
Physical Review **D 63** (2001) 124019 (9 pages)
20. Quasi-spherical approximation for rotating black holes  
with S.A. HAYWARD  
Physical Review **D 64** (2001) 044002 (8 pages)
21. Adjusted ADM systems and their expected stability properties: constraint propagation analysis in Schwarzschild spacetime  
with G. YONEDA  
Class. Quant. Grav. **19** (2002) 1027-1049
22. Fate of the first traversible wormhole: black-hole collapse or inflationary expansion  
with S.A. HAYWARD  
Physical Review **D 66** (2002) 044005 (9 pages)
23. Advantages of modified ADM formulation: constraint propagation analysis of Baumgarte-Shapiro-Shibata-Nakamura system  
with G. YONEDA  
Physical Review **D 66** (2002) 124003 (10 pages)

24. Diagonalizability of constraint propagation matrix  
with G. YONEDA  
Class. Quant. Grav. **20** (2003) L31-36 (Letter)
25. Toward standard testbeds for numerical relativity  
with M. ALCUBIERRE, G. ALLEN, C. BONA, D. FISKE, T. GOODALE, F.S. GUZMAN,  
I. HAWKE, S. HAWLEY, S. HUSA, M. KOPPITZ, C. LECHNER, D. POLLNEY, D.  
RIDEOUT, E. SCHNETTER, E. SEIDEL, D. SHOEMAKER, B. SZILAGYI, R. TAKAHASHI,  
AND J. WINICOUR  
(Mexico Numerical Relativity Workshop 2002 Participants),  
Class. Quant. Grav. **21** (2004) 589-613.
26. Constraint propagation in  $(N + 1)$ -dimensional space-time  
with G. YONEDA  
Gen. Rel. Grav. **36** (2004) 1931-1937
27. Gravitational radiation from mergers of intermediate-mass black-holes  
with T. MATSUBAYASHI and T. EBISUZAKI  
Astrophys. J. **614** (2004) 864-868
28. Observation results by the TAMA300 detector on gravitational wave bursts from stellar-  
core collapses  
with the TAMA collaboration  
Physical Review D **71** (2005) 082002 (17 pages)
29. Upper limits from the LIGO and TAMA detectors on the rate of gravitational-wave bursts  
with LIGO Scientific Collaboration, TAMA Collaboration  
Physical Review D **72** (2005) 122004 (16 pages)
30. Joint LIGO and TAMA300 Search for Gravitational Waves from Inspiralling Neutron  
Star Binaries  
with LIGO Scientific Collaboration, TAMA Collaboration  
Physical Review D **73** (2006) 102002 (10 pages)
31. Results of the search for inspiraling compact star binaries from TAMA300's observation  
in 2000-2004  
with TAMA Collaboration  
Physical Review D **74** (2006) 122002 (8 pages)
32. Numerical Experiments of adjusted BSSN systems for controlling constraint violations  
with K. KIUCHI  
Physical Review D **77** (2008) 044010 (11 pages)
33.  $N + 1$  formalism in Einstein-Gauss-Bonnet gravity  
with T. TORII  
Physical Review D **78** (2008) 084037 (13 pages)
34. Formulations of the Einstein equations for numerical simulations  
Journal of Korean Physical Society, 54 (2009) 2513-2528, available as arXiv:0805.0068

35. Black Objects and Hoop Conjecture in Five-dimensional Space-time  
with Y. YAMADA  
Class. Quantum Grav. 27 (2010) 045012 (15 pages)
36. Formation of naked singularities in five-dimensional space-time  
with Y. YAMADA  
Physical Review D **83** (2011) 064006 (5 pages)
37. Constraint propagation of  $C^2$ -adjusted formulation – Another recipe for robust ADM  
evolution system –  
with T. TSUCHIYA AND G. YONEDA  
Physical Review D **83** (2011) 064032 (10 pages)
38. Constraint propagation of  $C^2$ -adjusted formulation II – Another recipe for robust BSSN  
evolution system –  
with T. TSUCHIYA AND G. YONEDA  
Physical Review D **85** (2012) 044018 (12 pages)

### Review Articles

1. Re-formulating the Einstein equations for stable numerical simulations: Formulation  
Problem in Numerical Relativity  
with G. YONEDA  
For a part of the book *Recent Progress in Astronomy and Astrophysics* (Nova Science  
Publ., New York, 2004), available as gr-qc/0209111
2. Formulation Problem in Numerical Relativity (in Japanese)  
with G. YONEDA  
*Ouyou Suuri* (Journal of the Japan Society for Industrial and Applied Mathematics), **15**  
(March 2005), 2-15.
3. Formulations of the Einstein equations for numerical simulations  
Journal of Korean Physical Society, 54 (2009) 2513-2528, available as arXiv:0805.0068

### Lectureships

1. Introduction to Numerical Relativity  
Four-hour invited lecture at Asia-Pacific Center for Theoretical Physics *Winter School on  
Gravitation and Cosmology* (Ewha Womans University, Seoul, Korea, January, 2003)  
Lecture note is available at <http://www.is.oit.ac.jp/~shinkai/lecture/winterAPCTP/>
2. Formulation Problem in Numerical Relativity  
Two-hour invited lecture at Asia-Pacific Center for Theoretical Physics (APCTP) *Win-  
ter School on Black Hole Astrophysics 2008* (Korea Astronomy & Space Science Institute  
(KASI), Daejeon, Korea, January, 2008)  
Lecture note is available at <http://www.is.oit.ac.jp/~shinkai/lecture/winterAPCTP/>
3. Numerical Approaches in General Relativity (in Japanese)  
Two-days invited lecture at Kinki University, Osaka, Japan  
Lecture note is available at  
[http://www.is.oit.ac.jp/~shinkai/lecture/seminar2011\\_KinkiU](http://www.is.oit.ac.jp/~shinkai/lecture/seminar2011_KinkiU)

**Plenary/Invited talks at International Conferences**

1. Post-Newtonian neutron star binary initial data for numerical relativity  
H. SHINKAI  
Initial data for black hole binary, Invited talk [Berlin, June 1999]
2. Re-formulate the Einstein equations for stable numerical simulations  
H. SHINKAI (invited talk)  
The 12th Workshop on General Relativity and Gravitation, [Tokyo Univ., Nov. 2002]  
(Proceedings, p137-151)
3. Controlling constraints in general relativity  
H. SHINKAI (invited talk at Minisymposia, "Numerical Methods for PDEs with Constraints")  
The 5th International Congress on Industrial and Applied Mathematics [Sydney, Australia, July 2003]

**Presentations at International Conferences / Workshops**

1. Gravitational waves in expanding Universes with cosmological constant  
H. SHINKAI AND K. MAEDA  
The Waseda Symposium on *Quantum Physics and the Universe*, (Pergamon Press Ltd, 1993, Vistas in Astronomy, 37, p.449)
2. Cosmic no hair conjecture in a planar universe  
H. SHINKAI AND K. MAEDA  
The Yamada Conference on *Evolution of the Universe and its Observational Quest*, (Universal Academy Press, 1994, The Proceedings ed. by K.Sato, p.533)
3. Inflation in a planar universe  
H. SHINKAI AND K. MAEDA  
The 7th Marcel Grossmann Meeting on *General Relativity* [Stanford Univ., August 1994]  
(World Scientific, 1997, should be published)
4. Numerical relativity using Ashtekar formulation  
H. SHINKAI AND G. YONEDA  
The 14th International Conference on General Relativity and Gravitation [Florence, August 1995]
5. Dynamics of topological defects near the Planck scale  
N. SAKAI, H. SHINKAI, T. TACHIZAWA AND K. MAEDA  
The 14th International Conference on General Relativity and Gravitation [Florence, August 1995]
6. Weyl scalar  $\Psi_i$  in 3+1 numerical spacetime  
H. SHINKAI  
The 7th Gregynog Workshop on Numerical Relativity, [Gregynog, August 1995]
7. Dynamics in the Ashtekar gravity  
H. SHINKAI AND G. YONEDA  
The 18th Texas Symposium on Relativistic Astrophysics, [Chicago, December 1996]
8. On reality conditions for Ashtekar variables and a trick of passing a degenerate point  
A. NAKAMICHI, G. YONEDA AND H. SHINKAI  
The 18th Texas Symposium on Relativistic Astrophysics, [Chicago, December 1996]

9. Can we detect Brans-Dicke scalar gravitational waves in gravitational collapse?  
H. SHINKAI, M. SAIJO AND K. MAEDA  
The 18th Texas Symposium on Relativistic Astrophysics, [Chicago, December 1996]  
(World Scientific, 1998, p619)
10. Lorentzian dynamics in Ashtekar gravity  
H. SHINKAI AND G. YONEDA  
The 8th Marcel Grossmann Meeting, [Jerusalem, June 1997] (ed. by Tsvi Piran, World  
Scientific, 1999, p774), gr-qc/9710074
11. Newtonian and post-Newtonian binary neutron star mergers  
H. SHINKAI, W-M. SUEN, F.D. SWESTY, M. TOBIAS, E.Y.M. WANG, AND C. WILL  
The 8th Marcel Grossmann Meeting, [Jerusalem, June 1997] (ed. by Tsvi Piran, World  
Scientific, 1999, p771), gr-qc/9710073
12. Dynamical evolution of boson stars  
H. SHINKAI, J. BALAKRISHNA, G.L. COMER, E. SEIDEL AND W-M. SUEN  
The Numerical Astrophysics 98 [Tokyo, March 1998] (Kluwer Academic, 1999, p289)
13. Hyperbolic systems in the Ashtekar formulation – asymptotically stable and real-valued  
system as its application  
H. SHINKAI AND G. YONEDA  
Physics of strong gravitational fields, poster [UCSB, June 1999]
14. Post-Newtonian initial data approach for neutron star binary problem  
H. SHINKAI, W-M. SUEN AND C.M. WILL  
YKIS99 Black Holes and Gravitational Waves, poster [Kyoto, June 1999]
15. Hyperbolic formulations and numerical relativity  
H. SHINKAI AND G. YONEDA  
The 9th Marcel Grossmann Meeting, [Rome, July 2000] (Proceedings, p 1717-1718 (eds  
by V.G. Gurzadyan, R.T. Jantzen, R. Ruffini, World Scientific, 2003))
16. Will hyperbolic formulations help numerical relativity?  
H. SHINKAI AND G. YONEDA  
The 10th Workshop on General Relativity and Gravitation, [Osaka, September 2000]  
(Proceedings, p.80-86)
17. Quasi-spherical approximation for rotating black holes  
H. SHINKAI AND S. HAYWARD  
Workshop on Astrophysical Sources for Ground-Based Gravitational Wave Detectors,  
poster [Drexel Univ. Philadelphia, 2000 October]
18. Quasi-spherical approximation for rotating black holes  
H. SHINKAI AND S.A. HAYWARD  
The 16th International Conference on General Relativity and Gravitation [South Africa,  
July 2001]
19. Constraint propagation in the family of ADM systems  
H. SHINKAI AND G. YONEDA  
The 16th International Conference on General Relativity and Gravitation [South Africa,  
July 2001]
20. Adjusted Systems – adding constraints in RHS  
H. SHINKAI  
Workshop on Numerical Relativity 2002 [South Africa, July 2001]

21. Adjusted ADM systems and their expected stability properties  
H. SHINKAI AND G. YONEDA  
The 11th Workshop on General Relativity and Gravitation, [Waseda Univ., January 2002]  
(Proceedings, p223-227)
22. Systematic understanding of asymptotical stability via constraint propagation analysis  
— Proposals of Adjusted ADM Systems and Adjusted BSSN Systems —  
H. SHINKAI (60 min talk)  
Formulations of Einstein Equations for Numerical Relativity [Mexico City, May 2002]
23. Re-formulations of Einstein equations for stable numerical simulations  
H. SHINKAI (15 min talk)  
International Conference on Theoretical Physics [Paris, UNESCO July 2002]
24. Controlling constraints in free evolution systems  
H. SHINKAI (30 MIN TALK)  
Gravitation: A Decennial Perspective, [Penn State Univ., June 2003]
25. Gravitational Waves from merging intermediate-mass black-holes  
H. SHINKAI, T. MATSUBAYASHI AND T. EBISUZAKI (POSTER)  
Stellar-Mass, Intermediate-Mass, and Supermassive Black Holes, [Kyoto, October 2003]
26. Constraint propagation analysis and adjusted systems  
H. SHINKAI AND G. YONEDA  
Numerical Relativity: Formulation Problem II, [Mexico, December 2003]
27. Formulation Problem of Numerical Relativity  
G. YONEDA AND H. SHINKAI  
Tenth International Conference on Hyperbolic Problems [Osaka, September 2004]
28. Constraint propagation revisited (poster)  
H. SHINKAI AND G. YONEDA  
The 16th Workshop on General Relativity and Gravitation, [Niigata, November 2006]
29. Controlling constraint violation using adjusted ADM systems (poster)  
H. SHINKAI AND G. YONEDA  
The 18th International Conference on General Relativity and Gravitation, [Sydney, July 2007]
30. Controlling constraint violations in numerical relativity (poster)  
H. SHINKAI AND G. YONEDA  
The 8th Asia-Pacific International Conference on Gravitation and Astrophysics, [Nara, Japan, August 2007]
31. Application of adjusted BSSN systems to Apples-with-Apples tests (poster)  
K. KIUCHI AND H. SHINKAI  
The 8th Asia-Pacific International Conference on Gravitation and Astrophysics, [Nara, Japan, August 2007]
32. Application of adjusted BSSN systems to Apples-with-Apples tests (poster)  
K. KIUCHI AND H. SHINKAI  
The 8th Asia-Pacific International Conference on Gravitation and Astrophysics, [Nara, Japan, August 2007]
33. N+1 formalism in Einstein-Gauss-Bonnet gravity (poster)  
H. SHINKAI AND T. TORII  
The 17th Workshop on General Relativity and Gravitation (JGRG17), [Nagoya, Japan, December 2007]

34. Towards the dynamics in Einstein-Gauss-Bonnet gravity: Initial Value Problem (poster)  
H. SHINKAI AND T. TORII  
The 18th Workshop on General Relativity and Gravitation (JGRG18) , [Hiroshima, Japan, December 2008]
35. Apparent Horizon Formation in Five-dimensional Spacetime (poster)  
Y. YAMADA AND H. SHINKAI  
The 18th Workshop on General Relativity and Gravitation (JGRG18) , [Hiroshima, Japan, December 2008]
36. Constraint Propagation of  $C^2$ -adjusted Equations – Another Recipe for Robust Evolution Systems –(poster)  
T. TSUCHIYA, G. YONEDA AND H. SHINKAI  
The 19th Workshop on General Relativity and Gravitation (JGRG19) , [Tokyo, Japan, December 2009]
37. Black Objects and Hoop Conjecture in Five-dimensional Space-time (poster)  
Y. YAMADA AND H. SHINKAI  
The 19th Workshop on General Relativity and Gravitation (JGRG19) , [Tokyo, Japan, December 2009]
38. Black Objects and Hoop Conjecture in Five-dimensional Space-time  
H. SHINKAI AND Y. YAMADA  
The 19th International Conference on General Relativity and Gravitation, [Mexico City, Mexico, July 2010]
39. Constraint Propagation of  $C^2$ -adjusted Equations — Another Recipe for Robust Evolution Systems — (poster)  
H. SHINKAI, T. TSUCHIYA AND Y. YAMADA  
The 19th International Conference on General Relativity and Gravitation, [Mexico City, Mexico, July 2010]
40. Gravitational Collapse in Five-dimensional Space-time (poster)  
Y. YAMADA AND H. SHINKAI  
The 20th Workshop on General Relativity and Gravitation (JGRG20) , [Kyoto, Japan, September 2010]
41. Gravitational Collapse in Five-dimensional Space-time (poster)  
Y. YAMADA AND H. SHINKAI  
The 2010 Cosmo/CosPA International Workshop (Cosmo/CosPA 2010) , [Tokyo, Japan, September 2010]
42. Gravitational Collapse in Five-dimensional Space-time (25min talk)  
H. SHINKAI  
The 2011 Shanghai Asia-Pacific school on Gravitation, [Shanghai, China, February 2011]  
Int. J. Mod. Phys. Conf. Ser. 7 (2012) pp. 148-157
43. Gravitational collapse of ring objects in five-dimensional space-time (poster)  
Y. YAMADA AND H. SHINKAI  
The 21th Workshop on General Relativity and Gravitation (JGRG21) , [Tohoku U., Japan, September 2011]
44. Constraint propagation and constraint-damping in the  $C^2$ -adjusted formulation  
T. TSUCHIYA, G. YONEDA AND H. SHINKAI  
The 21th Workshop on General Relativity and Gravitation (JGRG21) , [Tohoku U., Japan, September 2011]

**Presentations at Domestic Workshops**

1. Gravitational waves in a planar universe with cosmological constant  
H. SHINKAI AND K. MAEDA  
The Workshop on General Relativity and Gravitation, [Tokyo Metropolitan University, December 1991]
2. Colliding plane gravitational waves (in Japanese)  
H. SHINKAI AND K. MAEDA  
The 2nd Gravitational Wave Symposium, [Atami, Dec. 1991]
3. Finding principal null directions for numerical relativists  
H. SHINKAI, L. GUNNERSEN AND K. MAEDA  
The 3rd Workshop on General Relativity and Gravitation, [Tokyo University, January 1994]
4. Numerical relativity using Ashtekar's variables  
H. SHINKAI AND G. YONEDA  
The 4th Workshop on General Relativity and Gravitation, [Kyoto University, November 1994]
5. Numerical study of topological inflationary scenario  
N. SAKAI, H. SHINKAI, T. TACHIZAWA AND K. MAEDA  
The 4th Workshop on General Relativity and Gravitation, [Kyoto University, November 1994]
6. Gravitational Faraday effect in colliding plane waves (in Japanese)  
H. SHINKAI  
The 7th Rironkon Simposium, [Tokyo National Observatory, December 1994]
7. Dynamics in the Ashtekar gravity  
H. SHINKAI, G. YONEDA AND A. NAKAMICHI  
The 5th Workshop on General Relativity and Gravitation, [Nagoya University, January 1996] (Proceedings, p.121-130)
8. A trick for passing degenerate points in the Ashtekar formulation  
A. NAKAMICHI, G. YONEDA AND H. SHINKAI  
The 6th Workshop on General Relativity and Gravitation, [Tokyo Institute of Technology, December 1996] (Proceedings, p.430-437)
9. Towards a numerical evolution using post-Newtonian initial data  
H. SHINKAI  
The 2nd Neutron Star Grand Challenge Meeting, [Washington University, May 1997] (Proceedings, 9 pages)
10. Boson Stars in Scalar-Tensor theories  
H. SHINKAI, G.L. COMER AND J. BALAKRISHNA  
The 7th Midwest Relativity Conference, [Washington University, November 1997] (Proceedings, p.28-32)
11. Constructing hyperbolic systems in the Ashtekar formulation  
G. YONEDA AND H. SHINKAI  
The 8th Workshop on General Relativity and Gravitation, [Niigata University, October 1998]
12. Symmetric hyperbolic and asymptotically constrained system based on Ashtekar's variable  
G. YONEDA AND H. SHINKAI  
The 9th Workshop on General Relativity and Gravitation, [Hiroshima University, November 1999] (Proceedings, p342-349)

13. Hyperbolic formulations of Ashtekar's new connection formulations and these numerical experiments  
H. SHINKAI AND G. YONEDA  
The 4th Eastern Gravity meeting, [Duquesne University, Pittsburgh, April 2000]
14. Asymptotically constrained systems for Numerical Relativity  
H. SHINKAI  
The 14th Rironkon Symposium, [Osaka, December 2001] (Proceedings p.93)
15. Stability of Wormholes  
H. SHINKAI  
Workshop on Spacetime singularity and its around, [Osaka, January 2002]
16. Numerical Relativity: Formulation Problems  
H. SHINKAI  
Workshop on Gravitational Wave Researches, [Kyoto, February 2002]
17. Numerical Experiments of Adjusted Einstein equations  
H. SHINKAI  
The 15th Rironkon Symposium, [NAOJ, Tokyo, December 2002] (Proceedings to be published)
18. Cactus as a Problem Solving Environment  
H. SHINKAI (invited talk)  
Grid-Computing Workshop, [Fujitsu, Tokyo, January 2003]
19. Numerical experiments of the adjusted Einstein equations  
H. SHINKAI  
Gravitational Waves and its around, [YITP, January 2003]
20. Gravitational waves from merging intermediate-mass black holes  
H. SHINKAI, T. MATSUBAYASHI, AND T. EBISUZAKI  
The 2nd DECIGO workshop, [NAO, May 2003]
21. Constraint propagation revisited  
H. SHINKAI AND G. YONEDA  
The 19th Rironkon Symposium [Rikkyo Univ., December 2006]
22. Numerical solutions in 5-dimensional momentarily static spacetime  
Y. YAMADA AND H. SHINKAI  
The 10th Spacetime Singularity Workshop [KEK, January 2009]
23. Numerical investigation of black objects  
Y. YAMADA AND H. SHINKAI  
The 3rd workshop on Higher-dimensional Black-holes [Kyoto, December 2009]
24. Black ring and hoop conjecture  
Y. YAMADA AND H. SHINKAI  
The 24th Rironkon Symposium [NAOJ, November 2011]

### **Presentations at the Official Society Meetings**

1. Dynamical evolution of inhomogeneous planar universe  
H. SHINKAI AND K. MAEDA  
The 41th Japan Physical Society Meeting, [Keio University, March 1992]
2. Gravitational waves in the expanding universe with cosmological constant  
H. SHINKAI AND K. MAEDA  
The 1992 Japan Astronomical Society Spring Meeting, [Osaka, May 1993]

3. Gravitational waves in the expanding universe with cosmological constant  
H. SHINKAI AND K. MAEDA  
The 42th Japan Physical Society Meeting, [Niigata University, October 1993]
4. Cosmic no hair conjecture in a planar universe  
H. SHINKAI AND K. MAEDA  
The 43th Japan Physical Society Meeting, [Tohoku, March 1993]
5. Generality of inflation in a planar universe  
H. SHINKAI AND K. MAEDA  
The 1993 Japan Astronomical Society Spring Meeting, [Sagamihara, May 1993]
6. Principal null directions for numerical relativists  
H. SHINKAI, L. GUNNARSEN AND K. MAEDA  
The 1993 Japan Astronomical Society Fall Meeting, [Kagoshima University, October 1993]
7. Inhomogeneous scalar field initial data in the spherically symmetric spacetime  
H. SHINKAI, T. CHIBA, K. NAKAO AND T. NAKAMURA  
The 45th Japan Physical Society Meeting, [Kyushu Kougyou University, March 1994]
8. Numerical studies of topological inflationary scenario  
H. SHINKAI, N. SAKAI, T. TACHIZAWA AND K. MAEDA  
The 46th Japan Physical Society Meeting, [Yamagata University, October 1994]
9. Gravitational Faraday effects in colliding gravitational waves  
H. SHINKAI  
The 1995 Japan Astronomical Society Spring Meeting, [Gakugei University, March 1995]
10. On connection approach to numerical relativity  
G. YONEDA AND H. SHINKAI  
The 47th Japan Physical Society Meeting, [Kanagawa University, March 1995]
11. Reality conditions and constraints in the Ashtekar formulation  
H. SHINKAI AND G. YONEDA  
The 48th Japan Physical Society Meeting, [Nagoya University, October 1995]
12. Can we pass degenerate points in the Ashtekar formulation?  
A. NAKAMICHI, H. SHINKAI AND G. YONEDA  
The 49th Japan Physical Society Meeting, [Kanazawa University, April 1996]
13. Numerical relativity with help of Ashtekar's variables  
H. SHINKAI AND G. YONEDA  
The 49th Japan Physical Society Meeting, [Kanazawa University, April 1996]
14. Lorenzian dynamics in Ashtekar gravity  
H. SHINKAI AND G. YONEDA  
The 50th Japan Physical Society Meeting, [Saga University, October 1996]
15. Boson stars in scalar-tensor theories  
H. SHINKAI, G.L. COMER AND J. BALAKRISHNA  
The 53th Japan Physical Society Meeting, [Nihon University, March 1998]
16. Constructing hyperbolic systems in the Ashtekar formulation of general relativity  
H. SHINKAI AND G. YONEDA  
The American Physical Society Meeting, [Atlanta, March 1999]
17. Post-Newtonian Initial Data Formulation for the Neutron Star Grand Challenge Project  
H. SHINKAI, M. MILLER, W-M. SUEN, M. TOBIAS, C. M. WILL  
The American Physical Society Meeting, [Atlanta, March 1999]

18. Hyperbolic systems of general relativity in the Ashtekar formulation  
G. YONEDA AND H. SHINKAI  
The 54th Japan Physical Society Meeting, [Shimane University, September 1999]
19. Constraint propagation of the Einstein equations  
G. YONEDA AND H. SHINKAI  
The 56th Japan Physical Society Meeting, [Chuo University, March 2001]
20. Quasi-spherical approach for numerical relativity  
H. SHINKAI AND S.A. HAYWARD  
The 56th Japan Physical Society Meeting, [Chuo University, March 2001]
21. Formulation of Einstein equations for stable numerical simulations  
H. SHINKAI AND G. YONEDA  
The 2002 Spring Japan Physical Society Meeting, [Ritsumeikan University, March 2002]
22. Formulation of Einstein equations for stable numerical simulations: II  
G. YONEDA AND H. SHINKAI  
The 2002 Fall Japan Physical Society Meeting, [Rikkyo University, September 2002]
23. Fate of the traversible wormholes  
H. SHINKAI AND S.A. HAYWARD  
The 2002 Fall Japan Physical Society Meeting, [Rikkyo University, September 2002]
24. Formulation of Einstein equations for stable numerical simulations: III  
H. SHINKAI AND G. YONEDA  
The 2003 Spring Japan Physical Society Meeting, [Tohoku-Gakuin University, March 2003]
25. Stable numerical simulations via adjusted ADM systems  
H. SHINKAI AND G. YONEDA  
The 2007 Spring Japan Physical Society Meeting, [Tokyo Metropolitan Univ., Mar. 2007]
26. Stable numerical simulations via adjusted BSSN systems  
K. KIUCHI AND H. SHINKAI  
The 2007 Fall Japan Physical Society Meeting, [Hokkaido Univ., Sep. 2007]
27. Black-hole formation and hoop conjecture in 5-dimensional space-time  
Y. YAMADA AND H. SHINKAI  
The 2009 Fall Japan Physical Society Meeting, [Konan Univ., Sep. 2009]
28. Numerical analysis of black-ring in 5-dimensional space-time  
Y. YAMADA AND H. SHINKAI  
The 2010 Spring Japan Physical Society Meeting, [Okayama Univ., Mar. 2010]
29. Constraint propagation of  $C^2$ -adjusted BSSN Equations  
T. TSUCHIYA, G. YONEDA AND H. SHINKAI  
The 2010 Fall Meeting of Japan Society for Industrial and Applied Mathematics, [Meiji Univ., Sep. 2010]
30. Numerical analysis of black-ring in 5-dimensional space-time (II)  
Y. YAMADA AND H. SHINKAI  
The 2010 Fall Japan Physical Society Meeting, [Kyushu Inst. Tech., Sep. 2010]
31. Gravitational collapses and naked singularity in 5-dimensional space-time  
Y. YAMADA AND H. SHINKAI  
The 2011 Spring Japan Physical Society Meeting, [~~cancelled~~, Mar. 2011]

32. Black ring and hoop conjecture  
Y. YAMADA AND H. SHINKAI  
The 2011 Fall Japan Physical Society Meeting, [Hirosaki U., Sep. 2011]

### Refereed Articles in Japanese

1. Numerical Study of Cosmic No Hair Conjecture  
H. SHINKAI, T. TSUKAMOTO AND K. MAEDA  
Bulletin of the Centre for Informatics, Waseda University, Vol.17, p.1-12 (1994)
2. Can We Determine the Theory of Gravity by Observing Gravitational Waves?  
M. SAIJO, H. SHINKAI AND K. MAEDA  
Bulletin of the Centre for Informatics, Waseda University, Vol.21, p.21-34 (1997)
3. Culture and History via Ancient Star Charts – Software for comparison of 28 constellations written in Takamatsuzuka Tomb with Present chart –  
with HIDEAKI KAWAZU  
in *Tenmon-Kyouiku*, May 2008 issue (Bulletin of the Society for Teaching and Popularization of Astronomy).
4. Difficulty Levels of *SUDOKU* – Proposals of *D*-Score based on Solving Logics –  
T. DODE AND H. SHINKAI  
Memoirs of Osaka Institute of Technology, A56, p.1-18 (2011)

### Textbooks

1. Calculus with Applications: A Structured Approach [Tettei-Kouryaku Bibun-Sekibun] (in Japanese, 244 pages)  
H. SHINKAI  
Kyoritsu Shuppan Inc. (2009, April) ISBN 978-4-320-01879-2
2. Ordinary Differential Equations with Applications: A Structured Approach [Tettei-Kouryaku Jou-Bibun-Houteishiki] (in Japanese, 248 pages)  
H. SHINKAI  
Kyoritsu Shuppan Inc. (2010, August) ISBN 978-4-320-01936-2
3. Probability and Statistics with Applications: A Structured Approach [Tettei-Kouryaku Kakuritsu-Toukei] (in Japanese, 280 pages)  
H. SHINKAI  
Kyoritsu Shuppan Inc. (2012, March) ISBN 978-4-320-11009-0

### Popular book

1. Timemachine and Science of Space-time [Taimu-Mashin to Jikuu no Kagaku] (in Japanese, 240 pages)  
H. SHINKAI  
Natsume Shuppan Inc. (2011, February) ISBN 978-4-816-35025-2

### Translations

1. Life in the Universe, lectures by S.W.Hawking,  
Co-translation for a book “Uchuu ni okeru seimei”  
ed. by Katsuhiko Sato, (NTT Publ., 1993)
2. Numerical Relativity and Black Holes  
by P.Anninos, J.Masso, E.Seidel and W-M.Suen (Physics World, 1996 July, p43)  
translation for *Parity*, in June 1997 issue (Maruzen Co., 1997)

### Articles in Japanese Popular Magazine

1. Mass and Energy in Relativity  
in *Suuri-Kagaku*, Dec 2003 issue (Saiensu Co., Tokyo).
2. Wormholes: Recent Researches  
in *Parity*, May 2003 issue (Maruzen Co., Tokyo).

### Book Reviews

1. Textbooks for Physics Beginners (2) : Guidance by using computers,  
Butsuri (by Japan Physical Society), in August 2003 issue.
2. Universe and Particle 30 Lectures, by Morikazu Toda (Asakura 2002),  
Butsuri (by Japan Physical Society), in November 2002 issue.
3. Astrophysics with a PC by Paul Hellings (Japanese version, 2009) ,  
Butsuri (by Japan Physical Society), in November 2009 issue.

### Essay

1. Centre for Gravitational Physics and Geometry, Pennsylvania State Univeristy,  
as a part of series “research groups in abroad”  
Astronomical Herald (“Tenmon-Geppou” by Japan Astronomical Society), Vol.94 No.4  
(2001)

### Author Contribution

1. Dictionary on Frontier Physics (in Japanese, Sentan Kagaku Jiten) (Maruzen 2003).

### Editorial Contributions in Popular Magazines, Newspaper

1. What is Relativity? (in Japanese, Soutaisei Riron tte Nani?)  
Mainichi Shimbun Newspaper, October 25, 2011, (Tokyo, Japan)
2. Violation of Light Speed? (in Japanese, Kousoku no kabe ga yaburareta?)  
Newton, December 2011 issue, (Newton Press, Tokyo, Japan)
3. Science of Time Travel (in Japanese, Taimu Toraberu wo Kagaku suru)  
Newton, March 2012 issue, (Newton Press, Tokyo, Japan)
4. Can we travel time? (in Japanese, Taimu Toraberu ha dekiru noka)  
Newton Mook, June 2012 issue, (Newton Press, Tokyo, Japan)

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