Research Report 2015

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Publications

1. R. Carles, T. Ozawa
   Finite time extinction for nonlinear Schrödinger equation in 1D and 2D,
   Commun. PDE., 40(2015), 897-917.
   DOI:10.1080/03605302.2014.967356

2. K. Fujiwara, S. Machihara, T. Ozawa
   Well-posedness for the Cauchy problem for a system of semirelativistic equations,
   Commun. Math. Phys., 338(2015), 367-391. DOI:10.1007/s00220-015-2347-3

3. K. Fujiwara, S. Machihara, T. Ozawa
   On a system of semirelativistic equations in the energy space,
   Commun. Pure Appl. Anal., 14(2015), 1343-1355.

4. J. Fan, T. Ozawa
   Regularity criteria for the incompressible MHD with the Hall or ion-slip effects,
   International Journal of Mathematical Analysis, 9(2015), 1173-1186.
   http://dx.doi.org/10.12988/ijma.2015.5253

5. G. Hoshino, T. Ozawa
   Analytic smoothing effect for a system of Schrödinger equations
   with two wave interaction, Adv. Differential Equations, 20(2015), 697-716.

6. J. Fan, T. Ozawa
   Weak solutions to the Ginzburg-Landau model in superconductivity with
   the temporal gauge, Applicable Analysis,(2015)
   DOI:10.1080/00036811.2015.1084415

7. G. Hoshino, T. Ozawa
   Analytic smoothing effect for a system of Schrödinger equations
   with three wave interaction,
   Journal of Mathematical Physics, 56(2015)091513;
   DOI: 10.1063/1.4931659

8. K. Fujiwara, T. Ozawa
   Remarks on global solutions to the Cauchy problem for semirelativistic
   equations with power type nonlinearity,
   International Journal of Mathematical Analysis, 9(2015), 2599-2610.
   http://dx.doi.org/10.12988/ijma.2015.58211

9. S. Machihara, T. Ozawa, H. Wadade
Scaling invariant Hardy inequalities of multiple
logarithmic type on the whole space, Journal of Inequalities and Applications,
(2015) 2015:281, DOI: 10.1186/s13660-015-0806-1

10. N. Ioku, M. Ishiwata, T. Ozawa
Sharp remainder of a critical Hardy inequality,
Archiv der Mathematik, 106(2016), 65-71.
DOI: 10.1007/s00013-015-0841-7

11. K. Fujiwara, T. Ozawa
Weighted Lp-boundedness of convolution type integral operators
associated with bilinear estimates in the Sobolev spaces,
Journal of the Mathematical Society of Japan, 68(2016), 169-191.

12. J. Fan, T. Ozawa Regularity criteria for harmonic heat flow and related system,
Mathematische Nachrichten, 289(2016), 28-33.
DOI:10.1002/mana.201200219

13. G. Hoshino, T. Ozawa
Analytic smoothing effect for the cubic hyperbolic
Schrödinger equation in two space dimensions,
Electronic Journal of Differential Equations, 2016(2016), 1-8

14. G. Hoshino, T. Ozawa
Space-time analytic smoothing effect for
the pseudo-conformally invariant Schrodinger equations,
Nonlinear Differ. Equ. Appl., NoDEA, 23(2016),1-10
DOI 10.1007/s00030-016-0362-5.

Invited Talks

1. On the Hardy type inequalities
"Shinshu PDE Conference," Shinshu University, Matsumoto
June 12, 2015

2. On the Hardy type inequalities
"Monday Analysis Seminar," Hokkaido University, Sapporo
June 22, 2015

3. Hardy type inequalities
"Workshop on Partial Differential Equations and Numerical Analysis"
Nonlinear PDE Meeting at Yanbian University, July 2015, Yanji, China
July 8, 2015

4. Quadratic interactions in systems of dispersive equations
"10th International ISAAC Congress," University of Macau
August 5, 2015

5. Hardy inequalities of L^p type
"Kanazawa Analysis Workshop," Kanazawa University
August 27, 2015

6. On critical Hardy inequality
"Analysis Seminar in Peking University," Beijing, China
September 2, 2015

7. On the Hardy type inequalities
"The 3rd CAU-Kyoto U. Joint Workshop on Nonlinear PDEs," Jeju, Korea
September 21, 2015

8. On the Hardy type inequalities
"Second Workshop on Nonlinear Dispersive Equations," University of Campinas, Brazil
October 9, 2015

9. Life span of solutions to nonlinear Schrödinger equations on torus
"Workshop on Partial Differential Equations," Zhejiang Normal University, China
March 25, 2016

Conference Organized

1. Nonlinear Science Colloquium
Venue: Waseda University
May 13, 2015 Motoko Kotani (Tohoku University)
「数学による材料科学への挑戦 - トポロジカルな視点で」(in Japanese)
June 17, 2015 Hideo Kubo (Hokkaido University)
「バイオミメティクスと数理科学」(in Japanese)

2. International Workshop on "Fundamental Problems in Mathematical and Theoretical Physics"
Top Global University Project, Waseda University
Date: September 28 - October 3, 2015
Venue:Large Meeting Room, 1st Floor, 55 Bldg.

Research Summary

- We considered a nonlinear Schrödinger equation with power nonlinearity, either on a compact manifold without boundary, or on the whole space in the presence of harmonic confinement, in space dimension one and two. Up to introducing an extra superlinear damping to prevent finite time blow up, we have proved that the presence of a sublinear damping always leads to finite time extinction of the solution in 1D, and that the same phenomenon is present in the case of small mass initial data in 2D.

- The local well-posedness for the Cauchy problem of a system of semirelativistic equations in one space dimension has been shown in the Sobolev space H^s of order $s \geq 0$. We applied the standard contraction mapping theorem by using Bourgain type spaces $X^{s,b}$. We also used an auxiliary space for the solution in $L^2 = H^0$. We have given the global well-posedness by this conservation law and the argument of the persistence of regularity.

- An explicit representation has been given to the remainder of a critical Hardy inequality in $L^n(\mathbb{R}^n)$ with $n \geq 2$.