Research Report (September, 2022- March, 2021)

Enrollment from
September 2021

Department of Pure and Applied Physics   Kenta   TOMIOKA

I. List of Papers

1. T. Ozawa, K. Tomioka, Zakharov system in two space dimensions, Nonlinear Analysis, 214 (2022) 112532.

2. T. Ozawa, K. Tomioka, Schrödinger-improved Boussinesq system in two space dimensions, Journal of Evolution Equations, 22, Article number: 35 (2022).

3. T. Ozawa, K. Tomioka, Vanishing dispersion limit for Schrödinger-improved Boussinesq system in two space dimensions, Asymptotic Analysis (in press).

4. T. Ozawa, K. Tomioka, Global strong solutions of the coupled Klein-Gordon-Schrödinger equations, submitted.

II. List of Talks

1. 富岡健太, ザハロフ系の研究, 第 17 回数学総合若手研究集会：数学の交叉点 (Zoom を用いたオンラインでの開催), 2021 年 3 月 (口頭発表).

2. 富岡健太, プラズマ物理学に関する方程式の初期値問題について, 第 42 回発展方程式若手セミナー (Zoom を用いたオンラインでの開催), 2021 年 8 月 (口頭発表).

3. Kenta Tomioka, The Cauchy problem of nonlinear partial differential equations in plasma physics, International workshop on multiphase flows: Analysis, Modelling and Numerics (Online via Zoom), 2021 年 12 月 (口頭発表).

4. 富岡健太, Vanishing dispersion limit for Schrödinger-improved Boussinesq system, Nonlinear Wave Equations (早稲田大学), 2021 年 12 月 (口頭発表).

5. 富岡健太, プラズマ物理学に関連する非線型偏微分方程式の適切性と消滅極限について, RIMS 共同研究 (グループ型 A), 線形及び非線形分散型方程式に関する多角的研究 (京都大学), 2022 年 5 月 (口頭発表).

6. 富岡健太, The Cauchy problem for the nonlinear dispersive equation and its vanishing limit, 偏微分方程式セミナー (北海道大学), 2022 年 7 月 (口頭発表).

7. 富岡健太, シュレディンガー・改良ブシネスク系に対する分散消滅極限とその漸近形について, 第 43 回発展方程式若手セミナー (Zoom を用いたオンラインでの開催), 2022 年 9 月 (口頭発表) (題名訂正).

III. Research Results in AY2021

I studied the Cauchy problem for the nonlinear dispersive system in a general domain. For example, I treated the Zakharov system and the Schrödinger-improved Boussinesq system in two space dimensions and the Klein-Gordon-Schrödinger system in 1-4 space dimensions. There are few papers which are considered in a general domain, since it is difficult to use the Fourier analysis in a general domain. Therefore, it is important to consider the Cauchy problem for these systems in a general domain. We proved the well-posedness for these systems in a general domain by using the modified energy method without the Fourier analysis. Moreover, we considered the vanishing improvement/dispersion limit for the Schrödinger-improved Boussinesq system. Especially, we also considered the first approximation of the vanishing dispersion limit. The vanishing limit problem is to consider the zero limit of a parameter which is introduced to the system. The vanishing limit problem is important subject when we consider the change of the system.

IV. Research Plan for AY2022

I will consider the behavior of solutions for the Zakharov system. I will focus on the scattering in low space dimensions and the stability in high space dimensions. It is difficult to consider the behavior of solutions for the Zakharov system, since the Zakharov system has complicated interaction between equations. I will solve the influence of complicated interaction for the Zakharov system. I will also consider same problem for another systems.