Research Report（April, 2017 - March, 2018）

Enrollment from April 2017

Department of Pure and Applied Physics　Takanori KURODA

I. List of Papers

1. Kuroda, T.; ¥^Otani, M., ``Local well-posedness of the complex Ginzburg-Landau equation in bounded domains,'' {¥it Nonlinear Analysis,} (under review).

II. List of Talks

1. Takanori, K.; ¥^Otani, M.,『増大非線型項を持つ複素 Ginzburg-Landau 方程式の一般領域上に於ける時間局所適切性』, 第 39 回発展方程式若手セミナー, Nov. 3-6, 2017, グリーンホテル三ヶ根, Nishio (Aichi pref.).
2. Takanori, K.; ¥^Otani, M., ``Solvability of complex Ginzburg–Landau equations with non-dissipative terms in general domains,'' MSJ Autumn Meeting 2017, Sep. 11-14, 2017, Yamagata Univ., Yamagata.
3. Takanori, K.; ¥^Otani, M., ``The Asymptotic Analysis on a Complex Ginzburg-Landau Equation Based on the Potential-Well Method,'' International Workshop on the Multi-Phase Flow; Analysis, Modeling and Numerics, Nov. 28- Dec. 1, 2017, Waseda Univ., Tokyo.

III. Research Results in AY2017

We are studying the mathematical aspects of the complex Ginzburg-Landau (CGL) equations, which describe behavior of order parameters near critical points in phase-change phenomena or pattern formations. Especially we treated (CGL) equations with power type growth nonlinear terms and submitted a paper concerning local well-posedness of (CGL) equations in bounded domains (I-1), which we had shown so far. In this year, we were concerned with the initial-boundary value problem of (CGL) equations with power type growth nonlinear terms in general domains including unbounded domains. We showed local well-posedness and global existence with small initial data (II-1, 2).

IV. **Research Plan for AY2018**

In AY2018, we will study the complex Ginzburg-Landau equations with dissipative nonlinear terms. As for the initial-boundary value problem for such case, we obtaind the existence of global solution for any initial data taken from ¥({¥rm L}^2¥) without assuming boundedness of domains provided that parameters appearing in (CGL) satisfy some suitable conditions depending only on the power of nonlinear terms. It was shown that solutions belong to ¥({¥rm H}_0^1¥) for ¥(t > 0¥) (smoothing effect) as well. Hence, we will focus on the periodic (in time) problem for (CGL) with dissipative nonlinear terms. In order to deal with periodic problems, it is important to verify coerciveness of leading terms. Thus, we should need an additional assumption on the linear term which did not appear for the initial value problem. The aim of this study is to show the existence of periodic solutions in bounded or unbounded domains provided that parameters of (CGL) equations satisfy the same condition as in the initial value problem.