

博士課程学生 (Doctoral Course Students)

高橋 和音 (TAKAHASHI Kazune)
(FMSP コース生)

A. 研究概要

楕円型偏微分方程式の解の存在・非存在を，変分法を用いて研究している．昨年度は，ソボレフ臨界指数を持つ非斉次半線形楕円型偏微分方程式 $-\Delta u + au = bu^p + \lambda f$ を考察した．特に，領域の次元と解の存在・非存在の関係について研究した． b が領域の内点で最大値を達成し，その点の近傍で a が指数 q の増大度を持つとき，領域の次元が $6 + 2q$ 未満ならば，少なくとも2つの正値解が存在することを証明した．線形項の係数が解が存在する領域の次元に影響するのは，新しい現象であると思われる．

I study the existence and nonexistence of the solutions of elliptic PDEs using the variational method. I worked last academic year on the following nonhomogeneous semilinear elliptic equation involving the critical Sobolev exponent: $-\Delta u + au = bu^p + \lambda f$. Especially, I studied the relationship between the dimension of the domain and the existence and nonexistence of the solutions. I proved that provided b achieves its maximum at an inner point of the domain and a has a growth of the exponent q in some neighborhood of that point, then if the dimension of the domain is less than $6 + 2q$, there exist at least two positive solutions. It seems to be new that the coefficient of a linear term affects the dimension of the domain on which solutions exist.

B. 発表論文

1. K. Takahashi: “Semilinear elliptic equations with critical Sobolev exponent and non-homogeneous term”, 東京大学修士論文 (2015).

C. 口頭発表

1. Semilinear elliptic equations with critical Sobolev exponent and non-homogeneous term, RIMS Workshop: Shapes and other properties of solutions of PDEs, RIMS, Kyoto University, Japan, Nov 2015.

G. 受賞

1. Code Runner 2015, Final Round: 1st place, Recruit Career, Tokyo, Dec 2015.
2. SamurAI Coding 2014-15, World Final: 6th place, 77th Information Processing Society of Japan National Convention, Kyoto University, Japan, Mar 2015.
3. Code Festival 2014 AI Challenge, Final Round: 3rd place, Recruit Holdings, Tokyo, Nov 2014.
4. Code Runner 2014, Final Round: 7th place, Recruit Career, Tokyo, Nov 2014.