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### 研究概要

I study the existence and nonexistence of the solutions of elliptic PDEs using the variational method. Last academic year I worked 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.

### 発表論文

1. K. Takahashi: “Semilinear elliptic equations with critical Sobolev exponent and non-homogeneous term”, Master Thesis, The University of Tokyo (2015).

### 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.

### 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 Runner 2014, Final Round: 7th place, Recruit Career, Tokyo, Nov 2014.
4. Code Festival 2014 AI Challenge, Final Round: 3rd place, Recruit Holdings, Tokyo, Nov 2014.