# Workshop VI on Nonlinear Partial Differential Equation

## Announcement:

The workshop on non-linear partial differential equation invites some experts to share ideas and results on recent research in analysis of non-linear partial differential equations and their applications. The conference will mainly focus on fully nonlinear parabolic equations and non-uniformly nonlinear elliptic equations and their applications.

The workshop will be held at Minhang campus of Shanghai Jiao Tong University on June 10-11, 2017.

## Scientific Committee:

Congming Li (Shanghai Jiao Tong University)
Wenxiong Chen(Yeshiva University)
Lihe Wang (Shanghai Jiao Tong University)

## Organizing Committee:

Congming Li (Shanghai Jiao Tong University)
Lihe Wang (Shanghai Jiao Tong University)
Chunqin Zhou (Shanghai Jiao Tong University)
Deliang Xu (Shanghai Jiao Tong University)
Miaomiao Zhu (Shanghai Jiao Tong University)
Fang Wang (Shanghai Jiao Tong University)

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## Schedule

| June 10 | Talker | Title |
|---|---|---|
| 9:00:9:45 | Yingshu Lv | Symmetry and non-existence of solutions for a system of integral equations |
| 9:45-10:15 | Break | |
| 10:15-11:00 | Wenxiong Chen | Direct methods on non-local operators and symmetry of solutions for equations with fractional p-Laplacians |
| 11:00-11:45 | Yanqin Fang | Regularity and classification of solutions to static Hartree equations involving fractional Laplacians |
| 11:45-13:30 | Lunch | |
| 14:30-15:15 | Fang Wang | Limit of sharp Sobolev inequalities |
| 15:15-15:45 | Break | |
| 15:45-16:30 | Jiankai Xu | TBA |
| 16:30-17:15 | Wei Dai | Classification of smooth solutions to PDEs involving fractional and higher order Laplacians |
| **June 11** | **Talker** | **Title** |
| 9:00:9:45 | Tingzhi Cheng | TBA |
| 9:45-10:30 | Zhigang Wu | Symmetry properties in systems of fractional Laplacian equations |
| 10:30-11:15 | Tao Zhang | Blow-up analysis for solutions to Neumann boundary value problem. |
| 11:15-13:00 | Lunch | |

## Venues

Room 323 A
Math Building-3, Minhang Campus
Shanghai Jiao Tong University
800 Dongchuan Road

## Hotel:

Huhua International Hotel (上海沪华国际大酒店(鹤庆路店))
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## Sponsors:

School of Mathematical Sciences，Shanghai Jiao Tong University

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## Titles and abstracts:

**1、Yingshu Lv， Shanghai Jiao Tong University**

Title: Symmetry and non-existence of solutions for a system of integral equations

Abstract: In this talk, We discuss the symmetry and non-existence of solutions for a integral system. In critical and subcritical case, we obtain the radially symmetry property of solution by using the method of moving plane introduced by Chen-Li-Ou and also show that the solution must be zero in subcritical case. Furthermore, we consider the general form of f, and obtain the similar results as above.

**2、Yanqin Fang, Hunan University**

Title: Regularity and classification of solutions to static Hartree equations involving fractional Laplacians

Abstract: We are concerned with the fractional order equations with Hartree type critical non-linearity and its equivalent integral equations. We first prove a regularity result which indicates that weak solutions are smooth. Then, by applying the method of moving planes in integral forms, we prove that positive solutions u to the integral equation are radially symmetric about some point and derive the explicit forms for solution.

**3、Fang Wang，Shanghai Jiao Tong University**

Title: Limit of sharp Sobolev inequalities

Abstract: Consider the sharp Sobolev inequalities on the n-sphere. By assuming the dimension constant to be a continuous parameter, then the limit of sharp Sobolev inequalities gives the Moser-Trudinger inequality as n—>2. However, this is a “formal” proof of the Moser-Trudinger since the dimension constants can only be integers. In this talk, I will mainly introduce a new point of view to make the limit to

be mathematically true, by taking advantage of the fractional GJMS operators and their energy extension to the hyperbolic space.

**4、Zhigang Wu，Donghua University**

Title: Symmetry properties in systems of fractional Laplacian equations

Abstract: In this paper, we consider the general system of fractional Laplacian equations. By using a direct method of moving planes, we show that $u_i(x)$ ($i=1,2,\cdots,m$) are radial symmetric about the same point and strictly decreasing in the radial direction with respect to this point. Compared with Zhuo-Chen-Cui-Yuan \cite{zhuo}, our results include subcritical case, critical case and supercritical case, and we need not the nonlinear terms to be homogenous. In addition, we completely remove the nonnegativity of $\frac{\partial f_i}{\partial u_i}$, that is, our results also hold for the cooperative system.

**5、Wei Dai，Beihang University**

Title: Classification of smooth solutions to PDEs involving fractional and higher order Laplacians

Abstract: In this report, we will talk about some classification results of smooth solutions to fractional and higher order PDEs with local or nonlocal nonlinearities. These results include the classification of nonnegative solutions and Liouville type theorems. The best constants and extremal functions in the corresponding Hardy-Littlewood-Sobolev inequalities will also be discussed.

**6、Wenxiong Chen，Yeshiva University**

Title: Direct methods on non-local operators and symmetry of solutions for equations with fractional p-Laplacians

Abstract: In this talk, we will first give a survey on the direct methods we introduced in recent years to study nonlinear equations involving pseudo-differential nonlocal operators, such as the direct method of moving planes, moving spheres, and blowing-up and re-scaling. We prove a maximum principle for anti-symmetric functions and obtain other key ingredients for carrying on the method of moving planes, such as a key boundary estimate lemma. Then we establish radial symmetry and monotonicity for positive solutions to semi-linear equations involving the fractional p-Laplacian in a unit ball and in the whole space. We believe that the methods developed here can be applied to a variety of problems involving nonlinear nonlocal operators.

The left titles and abstracts need to be announced !