

# Exchange Program Agreement

## 1. Exchange Program Title

The title of the exchange program is: Efficient numerical methods for partial differential equation and its application.

## 2. Leading Scientists

### Party A: Xiangtan University (Chinese Side)

Principal Investigator: Prof. Dr. Yin Yang

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China

Main Participants (Participating Universities/Institutes and other Institutions):

Professor Dr. Guangming Zhou

Associate Professor Dr. Jianping Zhang

Associate Professor Dr. Haizhuan Yuan

### Party B: North-Eastern Federal University (Russian Side)

Principal Investigator: Dr. Aleksandr Vasilev

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Address: North-Eastern Federal University, Yakutsk City, Republic of Sakha  
(Yakutia), Russia

Main Participants (Participating Universities/Institutes and other Institutions):

Dr. Aleksandr Grigorev

Dr. Sergei Stepanov

### **3. Research Plan, Division of Labor and Timetable**

The program aims to develop new numerical methods with both high accuracy and less complexity for some class of partial differential equation. It will be developed in the following units:

#### **Unit A: Title: High efficient spectral methods for non-local equations**

**Investigators: Prof. Dr. Yin Yang**

This project will conduct bilateral cooperation and exchanges mainly on high efficient spectral methods for non-local equations. In this project, the Chinese side will focus on developing the high order numerical schemes for some selected non-local equations, such as Volterra-type integro-differential equations with singular kernel or delay, time, space and time-space fractional dynamical systems involving fractional derivatives. The Russian side will focus on applying the high order numerical schemes to some practical problem in fluid dynamics and materials science.

#### **Unit B: Title: High performance computing for extreme scale problems**

**Investigators: Dr. Aleksandr Vasilev**

This project will conduct bilateral cooperation and exchanges mainly on high performance computing for extreme scale problems. In this project, the Russian side will focus on developing advanced data-science algorithms and their coupling to model-based multiscale algorithms and applications for multi-physics problems. The Chinese side will focus on developing adaptive numerical algorithms for multi-physics problems.

In 1<sup>st</sup> to 15<sup>th</sup> September, 2019, the Russian side is going to visit China for communication on high performance computing for extreme scale problems. And from 1<sup>st</sup> to 15<sup>th</sup> August, 2020, the Chinese side is going to visit Russia for communication on high efficient spectral methods for non-local equations.

### **4. Ownership, Use and Transfer of the Intellectual Property**

Intellectual property rights of the program cover all results obtained within the program. The IPR of common results will be shared by all parties concerned. The IPR of results obtained independently by one party without any assistance from the other party or obtained before or after the collaboration will belong to the respective party.

Authorship and acknowledgement in papers should be based on contribution to

the program and decided in discussions involving all parties concerned.

Before submitting any application for realted intellectual property rights, one party should first consult with the other party and may proceed only after the other party has agreed without objection on the ownership of the IPR.

Without the written consent of both parties, none of the program's common IPR may be transferred to any third-party.

## **5. Duration**

The exchange program will start in 1<sup>st</sup> January, 2019 and end in 31<sup>st</sup> December, 2020. In 1<sup>st</sup> to 15<sup>th</sup> September 2019, the Russian side is going to visit China and organize bilateral conference. And the Chinese side is going to visit Russia and organize bilateral conference from 1<sup>st</sup> to 15<sup>th</sup> August, 2020.

## **6. Legal Validity**

This agreement comes into effect on 5<sup>th</sup> June, 2018 and terminates on 31<sup>st</sup> December, 2020 . It is made in two counterpart originals and two counterpart copies, with one of the originals to be retained by each of the two parties and one of the copies to be retained by NSFC and RFBR respectively.

## **7. Signatures**

This agreement constitutes the entire agreement between the parties.

Party A: Xiangtan University (Chinese Side)

Signature:

Time: June 5th, 2018

Place: Xiangtan University, China

Party B: North-Eastern Federal University

Signature:

Time: June 9th, 2018

Place: North-Eastern Federal University, Yakutsk, Russia