

2024 年 12 月 2 日

YYYY/MM/DD

Fellowship ID : 240201

独立行政法人日本学術振興会理事長 殿

To: President, Japan Society for the Promotion of Science

研究活動報告書

Research Report

1. 受入研究者/ Host researcher

受入研究機関・部局・職

Name of Host Institution, Department and Title

埼玉大学・大学院理工学研究科・教授

受入研究者氏名

Host Researcher's Name

福井 敏純

2. 外国人招へい研究者/ Fellow

所属研究機関・部局・職

Name of Institution, Department and Title

Université Côte d'Azur, Laboratoire J. A. Dieudonné, Professor

外国人招へい研究者氏名

Fellow's Name

Adam PARUSINSKI

3. 採用期間/ Fellowship Period

2024 年 11 月 2 日

～

2024 年 12 月 1 日

4. 研究課題/ Research Theme

特異点理論とその応用

(注) 採用期間終了後 3 ヶ月以内に提出

※ (Note) Submit the form within 3 months after the expiration of fellowship.

※ 様式 1 に記載された情報を元に確認しますので、部局名等の名称含め、内容に誤りが無いか必ずご確認ください。

5. 研究活動報告/ Research Report

(1) 研究活動の概要・成果/ Summary of Research Results

特異点理論とくに関数の特異点の双リプシッツ同値について埼玉大学福井と共同研究を行った。関数のリプシッツ同値と零点集合のリプシッツ同値の間には大きな隔たりがあり、そのギャップを埋めるのに必要な手法の検討を行った。また関連して研究集会での講演および埼玉大学のセミナーでの講演（下記）を行った。

Singularity Theory is a field of mathematics on the interface of Algebra, Analysis and Geometry. It deals with objects and phenomena that are not “smooth” and therefore cannot be easily handled. The main goal of singularity theory is describing how these objects depend on parameters, particularly in cases where the properties undergo sudden change under a small variation of the parameters. Both the French and the Japanese Singularity schools are among the leading in the world. Let me just mentioned such distinguished founding leaders (both recipients of the Fields medal the highest distinction in mathematics) Heisuke Hironaka and René Thom.

Working with the Japanese team. This was my first visit to Japan after the pandemic. I was working with the Japanese singularity team, in particular with Professor Toshizumi Fukui from Saitama University, Professor Satoshi Koike from Hyogo University of Teacher Education, Professor Toru Ohmoto from Waseda University and with Professor Kyoshi Takeuchi from Sendai University.

- With Professor Fukui and Professor Laurentiu Paunescu from the University of Sydney who was visiting Professor Fukui during the same period, we started a new collaboration on the bi-Lipschitz classification of polynomial function germs. We propose to use the method of Newton polygon to handle this important subject that attracted lot of attention in recent years. The work in progress and a paper in preparation.
- During my stay in Japan I have visited Professor Takeuchi in Sendai. We began a new collaboration on the singularity theory of complex polynomial and rational functions in the context of the recent developments in the irregular Riemann-Hilbert correspondence for holonomic D-modules and the Fourier-Sato transforms for enhanced ind-schemes, we study the Fourier transforms of some irregular holonomic D-modules.

Working with PhD students. During my stay in Japan I had several discussions with PhD students working in singularity theory. This included in particular

- With Atuski Hiramatsu., a PhD student of Professor Fukui, on the versality of the unfolding of regular surfaces.
- With Kazuki Kudomi, a PhD student of Professor Takeuchi, on the characteristic cycles of irregular holonomic D-modules.

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(2) 主な研究発表 (雑誌論文、学会、集会、知的財産権等) / Main Research Publications

研究集会 **Japanese Australian workshop on Real and Complex Singularities**, 4--7 November, 2024 Saitama University
で 講演 **Motivic, logarithmic, and topological Milnor fibrations** を行った。

11 月 25 日に埼玉大学にてセミナートーク **Arc-analytic triviality** を行った。

Conferences and Seminars. I was an invited speaker of the Japanese Australian workshop on Real and Complex Singularities, 4-7 November, 2024, that took place at Saitama University. I gave a talk entitled "Motivic, logarithmic, and topological Milnor fibrations", based on my recent paper accepted for publication in *Advances of Mathematics*. This was a big conference, see <https://www.rimath.saitama-u.ac.jp/lab.jp/Fukui/JARCS9/> for more information.

Another smaller meeting took part on November 27th at Waseda University. It reunited several Japanese researcher in singularity theory including Shihoko Ishii from the University of Tokyo. The subject was related to my earlier work on bi-Lipschitz classification of analytic function germs.

(3) その他/Remarks

東北大学竹内潔氏と有理型関数のミルナーファイバーのホモトピー型について共同研究を行った。

埼玉大学修士課程学生平松君とカスピダルクロスカップの平行曲面について、東北大学の博士課程学生久富君とは D 加群のフーリエ変換について討論を行った。

This stay was perfect, I could keep on my research, strengthen my collaborations and open new ones.

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