Scholar 411

Chapter 411: Explosive Equation?

Lu Zhou and Professor Fefferman reached a consensus on the proof idea, but there was a problem on how to go about constructing this abstract bilinear operator B'.

It had to have a similar nonlinear structure to the Euler linear operator B in μ(t), but at the same time, it also had to be different from B.

"Nonlinear" partial differential equations were complex.

And the series of problems derived from it was even more complex…

The first seminar in March; in a small conference room at the Princeton Institute for Advanced Study.

Professor Fefferman stared at the calculations on the blackboard and said thoughtfully, "I can guarantee you that we are close to the final result… We are so close."

Box..

Lu Zhou threw the chalk on the podium and nodded at the blackboard.

However, even though he nodded, he wasn't happy at all. In fact, he looked a bit gloomy.

After a while, Lu Zhou said, "… I feel the same way."

Professor Fefferman sighed and uncrossed his arms.

“Sometimes failure and success is only an inch apart, you know? I’m even starting to doubt…”

Lu Zhou looked at him.

“Doubt?”

Professor Fefferman nodded and said, “Although we were optimistic that this proposition must be correct, the results tell us that it may not be as perfect as what we think.”

Professor Fefferman spoke in an uncertain tone; it was completely different from when he was lecturing.

This was the first time he had been uncertain at his calculations.

Lu Zhou stared at the blackboard and went silent for a while. After a while, he finally talked again.

“This is ridiculous.”

Professor Fefferman sighed and said, “It is. This is ridiculous… but it’s not illogical.”

He took out a cigarette and lighter from his pocket.

Normally, smoking wasn’t allowed in the conference rooms; smokers had to go to the smoking room.

But this rule didn’t apply when one was doing research.

After all, the Institute for Advanced Study was established for science, and every rule here was made for scholars to do research.

Without hesitating, Professor Fefferman lit the cigarette and carefully placed it on the multimedia desk.

The smoke from the cigarette spiraled up into the air.

Soon after, the smoke gradually dispersed and disappeared into the air without a trace.

Professor Fefferman looked at this phenomenon as he spoke confidently.

“The final state of all systems is chaos, just like our equations. The μΔ value explodes as time increases and blasts truth into the universe. When the time variable is magnified, the equation will explode at an unknown point, and the solution will no longer be smooth…”

This point could not be infinite, and it definitely existed.

It was difficult to find its value by using existing mathematical tools. It was just like how the mathematicians could not solve the Navier–Stokes equation. However, it could be proved indirectly… provided that the proof process wasn’t wrong.

Professor Fefferman didn’t say anything else. Instead, he lit up another cigarette and smoked both at once.

Lu Zhou was certain that this wasn’t for science; it was only for Fefferman to relax.

Lu Zhou admitted that this was an uncomfortable feeling.

The results of the calculations were clear, but it deviated from common sense.

Would a car that was driving on the highway self-disintegrate at a random certain point in time? This was impossible. The worse case was a speeding ticket from the police.

If the conclusion was correct, then the three dimensional Navier–Stokes equation would undoubtedly “explode” past a certain point.

This meant that at some point in time and space, it would no longer retain its regularity…

This was ridiculous!

…

The Navier–Stokes equation research team reached a bottleneck.

At night, Lu Zhou went back to his routine. He put on his running attire and jogged around Lake Carnegie as he tried to relax his mind by breathing in the fresh air.

Unfortunately, he wasn't able to do so.

The problem that he discussed with Professor Fefferman earlier kept lingering in his mind.

Lu Zhou began to run faster and faster, and without knowing it, he was already sprinting.

He exhausted all of his energy, and his legs felt as if they were becoming heavier. He finally stopped running.

While panting, Lu Zhou walked to the grassy area and sat down.

Suddenly, a can of sports drink was thrown on the grass, and it rolled and stopped next to Lu Zhou.

Lu Zhou looked up and saw Molina in sportswear. She was holding another can of sports drink.

"For you."

Lu Zhou opened the can and took a big gulp.

He sighed in relief as he felt the cool liquid moving down his chest. He then wiped his mouth.

“Thank you,” Lu Zhou said.

“You’re welcome.”

Molina sat next to Lu Zhou. She opened her can of drink and took a sip.

When she saw that Lu Zhou was still panting, she said, “This isn’t like you.”

Lu Zhou smiled as he asked, “What do you mean?”

Molina said, “You were in much better shape two months ago. I guess you were completely relaxed during the holidays.”

Molina sounded like she was gloating. However, Lu Zhou didn’t know what she was gloating about.

Despite his time off, Lu Zhou could still easily destroy Molina’s supervisor at the IMU conference that was to be held in August this year…

“Maybe.”

Lu Zhou tossed the can into the garbage bin like it was a basketball.

The can swished into the garbage bin.

Lu Zhou began to stare at the lake.

He stayed silent for five minutes. Suddenly, he asked, “Do you think that Lake Carnegie will suddenly explode?”

“Are you saying there’s a bomb under the lake?” Molina raised her eyebrows and said, “You can’t make this joke in this country.”

Lu Zhou shook his head and said, “I meant… under normal conditions.”

Molina said, “Of course not… Why do you ask that?”

Lu Zhou sighed and said, “Because mathematics tells me there’s a possibility of it happening.”

Molina snorted.

“That’s bizarre.”

Lu Zhou looked at the lake water that was sparkling under the sunset as well as the kayaking club members training before he murmured, “Yeah, this is bizarre.”

But, is it possible?

For example, a water molecule in the system that is moving irregularly. Could its vector of motion randomly erupt in chaos? Just like how natural disasters are caused by coincidences where all of the “volatile” energy is released in an instant.

Lu Zhou kept thinking about the lake evaporating in an instant.

It won’t happen unless…

I throw a large bomb in the lake or something.

However, Lu Zhou research obviously didn't include "external factors".

Molina asked, "The lake exploding is a part of the Navier–Stokes equation?"

Lu Zhou nodded and replied, "Yes."

Chapter 413: Congratulations On Graduating

The next day, Lu Zhou ended his research retreat and went to his office at Princeton Institute for Advanced Study.

As usual, his students were there.

When they saw Lu Zhou in front of the office door, they were all surprised.

Vera was the first to speak.

Her little mouth opened, and she said in an astonished tone, "Professor, your retreat is over?"

"I guess so…" Lu Zhou looked at Vera before he looked at Hardy, and he could tell everyone was surprised.

Box..

He then asked, "Why are you guys looking at me like this?"

Jerick murmured, “Because if you come out of the house, it means you’ve succeeded…”

Wei Wen said, “Which means you’ve solved the Millennium Prize Problem?”

“Nope, but I have made some in-progress results.” Lu Zhou paused for a second before he continued, “But I’m not here to talk about that, I’m here to talk about the Collatz conjecture.”

Qin Yue asked, “Annual Mathematics replied?”

“Yes, your thesis was brilliant and Professor Peter Sarnak, who was your reviewer, had a high evaluation of your thesis.” Lu Zhou smiled as he continued, “Your thesis will be in the next issue of Annual Mathematics.”

When Vera heard that the reviewer was Peter Sarnak, she had a surprised look on her face.

Professor Sarnak was one of the leaders of modern number theory. They had obviously heard of him before.

Not just that, but this big name was also one of the editors at Annual Mathematics. In addition, he was also one of the six reviewers of Lu Zhou’s thesis on Goldbach’s conjecture.

Lu Zhou paused for a moment before he continued, “As I said, the Collatz conjecture is your graduation thesis. I originally only expect you to make a little progress on the conjecture, and I really didn’t expect you guys to solve the entire conjecture. I have to say, your performance really impressed me.”

Qin Yue smiled and said, “It’s mainly thanks to the mathematics tools that you provided. We couldn’t have done it on our own.”

Lu Zhou shook his head and said, “Tools still require a smart person to apply them. You guys are talented, so you don’t have to be humble. I hope you guys can continue down the number theory path and achieve greatness in the additive number theory field.”

He adjusted his demeanor and continued, “You guys have now officially graduated!”

Clap clap clap…

The office was filled with applause with Jerick and Wei Wen clapping the loudest.

Especially Wei Wen, he was looking jealously at Qin Yue.

Being able to publish a thesis on Annual Mathematics for the proof of the Collatz conjecture…

It was no exaggeration to say that Qin Yue’s name would appear in the Thousand People Initiative.

Whether Qin Yue wanted to stay overseas or return to China, there would be various academic institutions that would offer him a salary he couldn’t refuse.

Lu Zhou paused for a second. As he looked at his three students, he said, “I want to hear about your plans for the future.”

Whether his students wanted to keep researching or go work at another university, Lu Zhou would do anything he could to help.

For example, he could write letters of recommendation.

In academia, having a recommendation letter from a well-known scholar could be the deciding factor in an interview. Even if the interviewee didn’t perform well, his application would be taken seriously…

Hardy smiled and said, “Professor, if you want, I wish to continue studying under you.”

Lu Zhou replied, “Why wouldn’t I want that? I certainly welcome you guys to study a PhD under me.”

Although Hardy was a bit naughty sometimes, his strength was still ok.

Anyone that could study a master's in mathematics at Princeton was talented in their own respective fields of study. There were only "talented" and "extremely talented" students at Princeton.

Vera already told Lu Zhou her plans last year. She had even given Lu Zhou the application form. Qin Yue also planned to continue his studies at Princeton.

All three of his students planned on furthering their studies. Lu Zhou's research team at Princeton would soon consist of a postdoc computational materials fellow, three PhD students, and two master's students.

As for whether or not Lu Zhou wanted more students…

This depended on whether there were any new talents that could attract his interest.

After Lu Zhou finished dealing with his students, he made plans with Professor Fefferman to meet up.

He had a lot of research results to exchange with his partner…

…

A conference room at the Institute for Advanced Study.

Professor Fefferman read Lu Zhou's manuscript and rubbed his chin.

"Differential manifold… Seems interesting."

Compared to the abstract proof method, using a differential manifold to research the Navier–Stokes equation was undoubtedly a novel idea. Using a topology method seemed to be feasible.

However, Professor Fefferman had never done any research in this area. Therefore, he couldn't give Lu Zhou a definitive answer.

Professor Fefferman read the manuscript in its entirety before he asked, "How did you think of it?"

Lu Zhou said, "I was inspired when I was running around Lake Carnegie."

Surprised, Professor Fefferman looked at Lu Zhou before he said, "That's surprising… I'll have to go there more often in the future."

Lu Zhou diverted the conversation by asking, "What do you think about this method?"

"I don't know, I have to admit that this is an interesting idea. But I still prefer the abstract proof method."

Professor Fefferman sighed and picked up a piece of chalk. He spoke while he was writing on the blackboard, "Over the past month, I have tried to improve the bilinear operator B'. This construct is very close to the Euler linear operator B in μ(t)."

[μ(t)=e^(t△)·μ0+∫e^(t-t')△B(μ(t'), μ(t'))dt']

[…]

The calculation process was very similar to that of more than a month ago, and the calculus framework was still the same.

The only difference was the construction of the B' bilinear operator with respect to the obsolete <B'(μ, μ), μ>=0. Professor Fefferman used a very sophisticated method which made the B' operator very close to the original B'.

However…

Lu Zhou felt like something was missing.

He thought back to more than a month ago, and he suddenly frowned when he felt that the calculations looked unnatural.

Lu Zhou stared at the blackboard for a long time before he finally spoke.

“I think I know what the problem is…”

Chapter 414: Two Ways

When Professor Fefferman heard him, he was stunned.

He quickly asked in a serious tone, “Can you elaborate?”

“Of course.” Lu Zhou picked up the chalk and said, “But I need to use the blackboard.”

Once Lu Zhou had the idea, doing the calculations was just a matter of the application of mathematics.

It took about half an hour for him to fill in two blackboards.

Lu Zhou took a step back and looked at the calculations on the blackboard. He gently squeezed the chalk in his hand as he spoke confidently.

Box..

“In short, using the abstract proof method, we can only calculate the existence of T1 (>0). Therefore, the weak solution is smooth only in the time (0, T1), but the value of T1 is undetermined.”

This conclusion was wildly different from the proposed conclusion by the Millennium Prize Problem. This was probably equivalent to the difference between Newton's law of motion and the special theory of relativity.

The former defined the specific initial value and only applied to a finite time domain. The Navier–Stokes equation was about the existence of a smooth solution under three-dimensional conditions.

The reason why the equation they constructed exploded was that they set the known value at t=T1, and therefore, it exploded when the specific time value was outside of (0, T1).

This was exactly like how Newton's law of motion wasn't applicable in objects with a high velocity…

When Fefferman heard Lu Zhou's statement, he was speechless.

"… If you knew this already, why didn't you tell me earlier?"

Lu Zhou said apologetically, "… I only thought about it just now."

Professor Fefferman stared quietly at the blackboard for around ten minutes as he read the calculations over and over again. He then sighed.

"You are right; our previous idea wasn't perfect."

Things often became less mysterious once they were revealed.

Professor Fefferman paused for a second before he said, "However, as per what you said, if we can determine the T1 value is within a specific time interval of the Navier–Stokes equations, then a smooth solution exists."

Lu Zhou was stunned. He didn't expect Fefferman to persist with his abstract proof method.

Lu Zhou thought for a moment before he replied, “It’s not enough. We have to find a precise way to distinguish the original operator B from the constructed bilinear operator B’.”

Professor Fefferman sighed and said, “I know, but I think using our original research results is easier than using another idea. In my opinion, I think the abstract proof has potential.”

He went silent for a moment before he continued, “Since we are both people that prefer independent research, we should do the research separately.”

Although Fefferman was optimistic about Lu Zhou’s new idea, he still didn’t want to give up on his abstract proof idea.

Therefore, they would research in different directions.

This increased the chance of success.

Lu Zhou nodded, showing his agreement with Professor Fefferman’s proposal.

“This is the best choice.”

Mathematics conjectures could be solved through discussion, but discussions weren’t always necessary.

Lu Zhou returned home after his nightly run. He showered and went into his study room. He then turned on his computer and continued to edit his “L Manifold” document.

L Manifold was actually already a very impressive research result.

Just like the bilinear operator B’ that Professor Fefferman constructed, even if the smooth solution of Navier–Stokes equation couldn’t be solved, the tools they created could be published as independent research.

At least they could report it at the IMU conference.

As for the use of the tools?

It was most applicable to the Navier–Stokes equation, but it could also perform topology surgery on complex nonlinear differential structures, like manifolds. This would simplify complicated problems.

As for its possible applications in other fields, that would depend on the creativity of other researchers.

Maybe one day it could be applied in theoretical physics or engineering…

Lu Zhou stared at the computer screen as he sat quietly for a long time. In the end, he decided to submit his L Manifold thesis to Annual Mathematics.

As for the IMU conference in August…

He still planned on gifting the mathematics community with the Navier-Stokes equation solution.

Obviously, his plan consisted of a challenge.

After all, he only had a vague grasp on the Navier–Stokes equation.

Lu Zhou didn't know if he could actually solve the problem.

Soon after Lu Zhou uploaded the thesis, the L Manifold thesis passed the academic editors' examination and went into peer review. Meanwhile, the thesis on the Collatz conjecture was published in Annual Mathematics for the world to read.

Just as Lu Zhou expected.

The Collatz conjecture thesis caused a huge sensation in the academic world…

…

Kai University, Shiing-Shen Chern Mathematics Research Institute.

The latest issue of Annual Mathematics was laid open on the table.

Academician Zhang Yuping read the thesis in its entirety before he sighed and spoke with emotion.

“Professor Lu really is brilliant. Not only is he talented, but even his students are also talented…”

Academician Zhang knew who Qin Yue was; he was actually the one that wrote Qin Yue’s recommendation letter for Princeton.

To be honest, even though Academician Zhang encouraged Qin Yue to apply for a master’s degree under Professor Lu, he didn’t have much hope for Qin Yue.

Because back then, Professor Lu had just recently solved the Goldbach’s conjecture, and there wasn’t another mathematics professor in the world that was more “wanted” than Professor Lu.

After all, that was the Goldbach’s conjecture.

The problem that troubled Gauss, Euler, and other great mathematicians; the crown of number theory.

It even attracted attention from the Times magazine.

Standing next to Academician Zhang was the director of the Shiing-Shen Chern Mathematics Research Institute, Professor Fu Lei.

This director was slightly younger than Academician Zhang, but he was also a big name in the Chinese mathematics community.

Like Academician Zhang, who researched differential geometry, the director's main area of research wasn't number theory. It was group theory. However, this didn't prevent him from understanding the academic value of Lu Zhou's thesis.

Professor Fu went silent for a while before he asked, "This thesis… Do you really think his students wrote it?"

Academician Zhang smiled and said, "Of course! Who would be so generous to give their research results to students?"

The claim of research results was an ethics issue.

Generally, it was rare for a supervisor to not steal their students' research results.

As for allowing the students to take credit for the research…

No normal person would do this.

Professor Fu knew this, but he couldn't help but say, "But I don't understand! If his students can solve it, why doesn't he solve it himself?"

"Don't over-think it. You can't apply normal people logic to a genius like him." Academician Zhang smiled and said, "Maybe he's not interested in a simple problem like this, and therefore, he handed it to his students."

Professor Fu didn't believe this. It sounded too ridiculous.

Collatz conjecture wasn't just a simple problem.

Even though there weren't that many people who researched this conjecture, there were many people that paid attention to it.

If it were him, he would never do something like this. After all, anyone that solved a conjecture like this, they could easily become an academician as long as they met the qualification and age requirements.

Academician Zhang could tell that Professor Fu was in disbelief, and so, he merely smiled and didn't try to explain.

Academician Zhang was correct. There were some people in the mathematics world that weren't interested in "simple" mathematical problems.

For example, Grothendieck, Hilbert…

They were all revolutionary mathematicians.

Lu Zhou was far from being revolutionary. However, he was still young and had a long way to go…

Academician Zhang paused for a second before he smiled and said, "It's normal to not be interested. I recently heard that Professor Lu is researching another big project. In contrast, the Collatz conjecture is nothing."

"Something better than the Collatz conjecture?" Fu Lei frowned as he asked, "Is it chemistry? Physics-related?"

Academician Zhang laughed and said, "Not related to chemistry. Kind of related to physics but not quite."

Fu Lei couldn't help but ask, "What is it?"

“It’s about the existence of a smooth Navier–Stokes equation solution,” Academician Zhang said while looking out the window. His tone was full of emotion as he continued, “And that’s one of the seven Millennium Prize Problems.”

Fu Lei was totally shocked.

He stood there with his mouth agape.

“… Is he at this level yet?”

“You don’t think so?” Academician Zhang smiled and said, “Otherwise, why did the country give the first-level State Natural Science Award to a 20-year-old?”

Academician Zhang heard a rumor.

Before the Science and Technology Award Conference began, he heard that the leaders of the Ministry of Science and Technology believed that Lu Zhou shouldn’t win the first-level State Natural Science Award.

After all, Lu Zhou was decades younger than the other winners.

However, in the end, the higher-ups still decided to give Lu Zhou the first-level State Natural Science Award.

There were many rumors as to why they did so.

Among them, the most credible and widely accepted rumor was that there was a highly ranked person in academia that convinced the prize committee to take this risk.

This person convinced the prize committee with only one reason.

It was rumored that the International Mathematical Union would invite Professor Lu to do a one-hour report during the Fields Medal Award Ceremony in August. Not just that, but the Nobel Prize winner Professor Ertl would also nominate Lu Zhou for this year's Nobel Prize in Chemistry.

At first, Academician Zhang didn't believe that Lu Zhou could solve the Millennium Prize Problem, but Lu Zhou created so many miracles that Academician Zhang couldn't help but believe that he could do it.

Because the name Lu Zhou was always associated with miracles.

Professor Fu thought for a moment before he muttered, "… If only this guy can work at our research institute."

Of course, he was only kidding.

Even if Professor Lu returned to China, he would definitely work at his own research institute.

Just like the Shiing-Shen Chern Mathematics Research Institute, or like the Qiu Chengtong Mathematics Research Institute…

Academician Zhang laughed and said, "Forget about it! He'll never come work for us. However, we can try to contact his students."

Professor Fu said, "So what you're saying is?"

Academician Zhang said seriously, "I will write a letter to the higher-ups and recommend Qin Yue to the Thousand Talents Initiative.

"Whether he intends to return to China or continue researching, we should start preparing now!"

Chapter 416: Busy July

Translator: Henyee Translations Editor: Henyee Translations

Lu Zhou was determined to report on the Navier-Stokes equation at the International Congress of Mathematicians. Therefore, he didn't have any time to waste.

It was early April, and the conference was in early August. At the very latest, he had to complete his Navier–Stokes equation thesis by early July.

Which meant he only had three months left.

In a situation like this, his only option was to go on a grinding session…

The days of researching quickly flew by, and it was soon July.

It was getting closer and closer to the conference date, and the International Mathematical Union had sent Lu Zhou multiple emails to remind him to update his report content information on the website.

Box..

Normally, participants had to disclose the content of their report before the conference began. They also had to upload the entire report script before a certain date.

Lu Zhou finally got around to doing this. He logged into his International Mathematical Union account and updated his report information for the International Congress of Mathematicians.

Most people updated their report information half a year ago, and it was rare to see people updating information a month before the conference.

Since it was a one-hour report, and the report presenter was a well-known international scholar, everyone was paying attention to Lu Zhou's report content.

A few months ago, various online mathematics forums were talking about what Professor Lu was cooking up.

Many people in the number theory field checked the official website daily, in hopes of seeing Lu Zhou's topic for his report.

Lu Zhou's report content met everyone's expectations.

When the community saw the report topic was on the Navier–Stokes equation, the entire mathematics community exploded…

On a well-known Europe mathematics forum.

[The existence of a smooth Navier–Stokes equation solution? How is this possible?]

[How many times have people claimed to have solved the Navier–Stokes equation?]

[Countless…]

[Last time was the scholar from Kazakhstan, this time it's a Chinese scholar. Do third world countries really want the one million dollar prize that bad?]

[Let's wait until we see his thesis. No one knows yet. What if he really solves the Millennium Prize Problem? Just like how he solved Goldbach's conjecture.]

[This is impossible! Navier–Stokes equation and Goldbach's conjecture are on completely different levels! One is a partial differential equation, the other is number theory! No matter how smart he is, there is no way he can reach the top of two different fields!]

The online debate was fierce.

It wasn't just people online, but many famous mathematics scholars were also paying attention to this unexpected announcement.

Tao Zhexuan was obviously one of them.

Actually, Tao Zhexuan had been doing research on the Navier–Stokes equation in as early as 2007. He had even published a couple of theses.

Tao Zhexuan expressed his opinion on his most recent blog.

[… It is difficult for me to give my opinion before reading the thesis. But according to my understanding of him, although he likes taking risks, he won't do anything that he is unsure of.

[Also, two months ago, I noticed his latest research on Annual Mathematics. Many of you might know the thesis contained a very novel differential manifold. It was called the L Manifold.

[I was confused at L Manifold's specific use. That was until I delved into research on the relationship between partial differential equations and topology.

[Undoubtedly, this is a very interesting differential geometry tool. Since then, I had a feeling that it might be used to solve the Navier–Stokes equations.]

The discussions weren't just happening online.

Two weeks after Lu Zhou posted his report topic, a silver plane flew across the Atlantic Ocean from Europe to North America.

Lions dragged his suitcase out of New York International Airport. He then gave his old friend Fefferman a warm hug.

"Long time no see, my friend."

"Long time no see!" Professor Fefferman patted his old friend's shoulder and asked, "What brings you here?"

Standing in front of Professor Fefferman was Professor Lions from École Normale Supérieure. He was a 1994 Fields Medal winner who had made outstanding contributions to nonlinear partial differential equations and Boltzmann equations.

Lions had always paid attention to the latest research results on the Navier–Stokes equation.

What he saw that Lu Zhou chose the Navier–Stokes equation as his report topic, he immediately hopped on a plane from Paris to Princeton. He also visited his old friend who was the head of the mathematics department at Princeton.

"… I'm curious," Lions said as he placed his suitcase into the trunk. Before he could fasten his seatbelt, he asked, "Did you guys really solve the Navier–Stokes equation?"

Professor Fefferman was holding the steering wheel, and he paused for a second.

After a while, he shook his head.

"… Sorry, I don't know."

Lions was stunned.

He spoke in disbelief.

"You don't know? Haven't you guys been working on this research project together?"

"That's right." Professor Fefferman started the car and said, "We were actually working on the Navier–Stokes equation project together, but two months ago, we decided to work on the problem in different ways and to do independent research…"

Until now, he was still trying to use his abstract proof method.

He wasn’t sure which step Lu Zhou was on.

Lions: “…”

Conducting research using two completely different methods.

Only geniuses could do something like this.

Lions went silent for a while before he said, “Can you take me to see Professor Lu? I want to talk to him.”

Fefferman shook his head and said, “I’m afraid I can’t.”

Lions asked, “Why?”

Fefferman sighed and said, “He likes to lock himself in his house when he dives deep into research. Whenever he enters a state like this, unless he was satisfied with his research progress or an earthquake happened, he won’t leave his house.”

To be honest, Fefferman didn’t even think an earthquake would do it.

Lions was astonished. “This… is ridiculous.”

Fefferman smiled and shook his head. He then said, “I was just as surprised as you at first. After all, this is the 21st century. I can’t believe there’s someone using this type of retreat method other than Perelman. And even Perelman only reduces his traveling. He doesn’t shield himself completely from the outside world. But I’m used to it.”

The professor asked, “Is he… that type of introverted scholar?”

Professor Fefferman waved his hand and said, “Not exactly. He’s quite easy to get along with. Everyone in Princeton knows about his unique research method. I heard from my Chinese students that this method is very common in China.”

Lions immediately asked, “What research method?”

Fefferman had a serious look on his face as he said, “They call it ‘grinding’…”

Chapter 418: Small World

The phone call ended.

Within 20 minutes, Lu Zhou heard knocking sounds from his front door.

Lu Zhou came out of the toilet and went downstairs.

He then saw Professor Fefferman who was breathing heavily at his front steps.

Upon seeing him, Fefferman immediately asked, “You really, really solved it? The Navier–Stokes equation?”

Lu Zhou looked at Professor Fefferman, who was gasping.

Box..

“… Do you want to catch your breath first?”

“No, it’s fine.” Fefferman leaned against the door with his hand and said, “Tell me, how did you do it?”

Fefferman was usually gentle and easy-going; he had never been this serious before.

Lu Zhou could tell Fefferman was craving for an answer.

"… Long story, come with me."

Lu Zhou turned around and walked upstairs.

Lu Zhou brought Professor Fefferman to the second floor, and they went into his study room. He cleaned up his messy table and floor before he pulled out a one-hundred-page manuscript. He handed the manuscript to Professor Fefferman.

Professor Fefferman took the manuscript and began to think while Lu Zhou spoke.

"I made references to the L Manifold thesis that I published in Annual Mathematics a while ago. If you haven't read that, I suggest you read the two theses together."

Professor Fefferman ignored Lu Zhou's advice and stood there flipping through the pages without saying anything else.

An hour passed by.

Finally, he put down the thesis and spoke emotionally.

"… Unbelievable, this is incredible."

An hour wasn't enough to understand the core ideas of the thesis, but for Fefferman, it was enough time to skim through the thesis.

A major mathematics conjecture proof had to pass through rigorous review from the entire mathematics community, but after an hour of reading, Fefferman couldn't find any mistakes.

The thesis ideas and words were smooth, rigorous, clean, and neat.

Fefferman was mostly surprised at Lu Zhou's ingenious mathematics methods.

"It really is shocking." Lu Zhou made two cups of coffee, and he handed Fefferman a cup before he said in a joking tone, "When I proved the last lemma, even I was surprised by my own wit."

Professor Fefferman took the coffee. He then shook his head and said, "No, it's not just the last lemma, you don't understand what you did."

Lu Zhou asked, "What do you mean?"

"You used the L Manifold to introduce a differential geometry method into the partial differential equations. You've even successfully integrated the principle of topological psychology… I've never seen this before."

Professor Fefferman felt a little thirsty, so he took a sip of the coffee.

After that, he spoke in a half-joking tone.

"Gromov, who introduced the concept of pseudo-holomorphic curves into differential geometry, invented symplectic geometry. And Qiu Chengtong, who introduced the partial differential method into differential geometry, was the founding father of geometric analysis. In my opinion, the L Manifold has the same significance. If I were you, I would think about naming this new mathematical field."

Lu Zhou didn't want to think of another name.

"Let's talk about naming things later, I need to rest right now."

Fefferman's reaction was strong, and he immediately said, "No! You can't rest, not until you transfer the manuscript into an electronic file!"

Fefferman didn't look like he was joking, so Lu Zhou said, "… But can't I postpone the uploading of the thesis for a few days? I was invited to do an hour-long report, surely they will allow me to do this."

I'm an internationally renowned scholar, they must give me some leeway?

I'm not postponing on purpose, I'm just too tired.

Professor Fefferman shook his head.

"You can postpone the upload, but this is a hundred-page thesis, how long do you plan on postponing? Not to mention, you have to edit some of the details in the thesis. I will send a letter to the International Mathematical Union for you. What you have to do now is to sort out your thesis within three days, a week at the latest!"

Professor Fefferman placed the coffee cup on the table and started to walk out the door.

However, he suddenly remembered something.

Fefferman took a deep breath before he turned around and looked at Lu Zhou.

"Oh yeah, I nearly forgot. I have to say thank you."

"Thank you?" Lu Zhou smiled and said, "What is there to thank me for? You're a member of NS research project team as well."

Professor Fefferman shook his head and said, "No, I'm not talking about that."

He paused for three seconds before he cleared his throat and spoke in a solemn voice.

“Whether it is about boats producing ripples on water or jets producing turbulence in the sky, mathematicians and physicists believe the Navier–Stokes equation can predict these phenomena…”

Lu Zhou was stunned.

He suddenly felt like he had heard this quote somewhere before.

Lu Zhou replied, “… Although the Navier–Stokes equation was proposed in the 19th century, we have a very little understanding of the equation.”

“That’s right,” Professor Fefferman said with a smile as he nodded at Lu Zhou. He then said, “Hence, we are the first scholars in the world to change the history of mathematics and challenge the Navier–Stokes equation puzzle!”

The study room went silent for a moment.

Lu Zhou finally remembered where he heard this monologue before.

“… This is the declaration speech from the Clay Institute at the Millennium Mathematical Conference at the French Academy?”

“That’s right,” Professor Fefferman said. He then smiled and continued, “On May 24th, 2000, at the Millennium Mathematical Conference at the French Academy, the Clay Institute announced seven Millennium Prize Problems, one of which is the Navier–Stokes equation. This monologue was regarding the Navier–Stokes equation.

“And I was the person that gave this monologue.”

Lu Zhou was stunned.

He knew the seven Millennium Prize Problems was created by the Clay Institute, and he knew about the Millennium Mathematical Conference held at the Paris Academy.

But he never thought that the person who proposed the Navier–Stokes equation as one of the Millennium Prize Problems was his research project team member?

This was almost like he defeated the person that wrote the exam…

Okay, that metaphor wasn't appropriate.

"Defeat" wasn't the right word.

"Congratulations, Professor Lu," Professor Fefferman said. As he held Lu Zhou's right hand tightly, he said, "You have re-written history, and I, am the witness of this historical moment!

"Remember to upload the thesis on time. Also, protect this manuscript, it might become a museum-worthy item one day."

Fefferman smiled before he left.

As Lu Zhou looked at him leaving, he smiled and shook his head.

He looked at the manuscript in his hand and whispered, "… Princeton really is a magical place."

Chapter 419: Eliminating the Navier-Stokes Equation

After Professor Fefferman left, Lu Zhou took out his phone to call Wei Wen.

The phone quickly connected.

"Hello?"

Lu Zhou asked, “Are you free right now?”

Wei Wen said, “I am, why?”

Lu Zhou said, “Come to my house. If Jerick is there, bring him along. I have a manuscript that I have to transfer to the computer, and I need your help!”

Box..

…

Lu Zhou wasn’t the first to use a topology method to research partial differential equations. This method was first seen in Hilbert’s thesis, and later on, it was also seen in Banach and Braun’s theses.

One of the more recent applications of this method was probably by the French mathematician Leray Schauder; this was one of the reasons he won the 1979 Wolf Prize.

However, even with these theses and research results, using topological methods to study partial differential equations had never become an independent discipline.

It wasn’t even considered a branch of research; it was merely a research idea or research style.

Lu Zhou introduced differential geometry and topology ideas into the field of partial differential equations by inventing the L Manifold. This allowed him to finally prove the existence of a smooth Navier–Stokes equation solution. This meant that Lu Zhou had perfected this mathematical method.

Therefore, it was no exaggeration when Professor Fefferman said that Lu Zhou had created a new discipline.

As for this discipline’s name, Lu Zhou hadn’t thought of a name yet.

Maybe in the future, he might consider sorting out his theories and methods into a textbook, and at that time, he could name this emerging discipline.

Of course, it would be better if someone else was willing to do it.

After all, writing textbooks was a very daunting task. Not only did one had to consult a large number of resources, but one also had to consider the readers. The textbook had to be both interesting and challenging. Instead of sharing knowledge, Lu Zhou preferred to absorb and create knowledge.

After Wei Wen received Lu Zhou's phone call, he immediately brought Jerick to Lu Zhou's house. Wei Wen even brought his work laptop.

After three days.

With the help of his two students, Lu Zhou finally transferred his thesis into the computer and uploaded it onto the official website.

Prior to this, Professor Fefferman helped him contacted the International Mathematical Union and explained Lu Zhou's situation to the Union. After hearing Lu Zhou's story, the International Mathematical Union was happy to extend the submission deadline by one week.

Not just that, but due to the importance of the Millennium Prize Problem, the IMU changed Lu Zhou's report date. Originally, Lu Zhou was going to make his report during the opening ceremony on the first day, but the IMU rearranged it so that Lu Zhou could report it one day before the opening ceremony as a special "Navier–Stokes equation" event.

As for why this arrangement was made, the reason was simple.

It was a hundred-page thesis on the popular Navier-Stokes equation. Not to mention, the audience would undoubtedly want to ask questions. One hour was simply not enough for a report.

Lu Zhou looked at his two exhausted students and felt a little apologetic.

“Good work… I’ll buy you guys food in a few days. Go get some sleep.”

They stayed up all night with Lu Zhou. Since Lu Zhou was used to pulling all-nighters, his body’s metabolic function had been strengthened, and it was much more capable than the bodies of the two rookies.

Jerick placed his head down on the table, and within two seconds, he began to snore.

However, Wei Wen’s reaction was the opposite.

“No, I’m not tired!”

Although Wei Wen had dark circles around his eyes, he was still energetic. He checked the thesis on the computer screen over and over again, reading every symbol and every punctuation.

“I will check it again; one last time!”

He had said that multiple times already.

Lu Zhou stared at Wei Wen and said, “Don’t tire yourself out, checking it once is enough.”

Lu Zhou had more than enough time to edit the thesis, so they didn’t need to finish the edits today.

Wei Wen felt like Lu Zhou wasn’t treating the problem seriously.

“Professor, but this is the Navier–Stokes equation!”

Lu Zhou replied, “Yeah.”

Wei Wen was stunned at how nonchalantly Lu Zhou was treating this thing.

“Aren’t you excited at all?”

Lu Zhou said, “I was excited in the beginning… but I can’t be excited for three days straight, right?”

Wei Wen: “…”

Why not?

This is a Millennium Prize Problem!

If it were Wei Wen, he would be excited for the rest of his life…

…

Lu Zhou postponed his thesis upload by three days.

As a result, the peers who were paying attention to this thesis also had to wait an extra three days.

Less than an hour after the thesis was uploaded, the International Congress of Mathematicians website reached an all-time high of concurrent users; it nearly crashed the website servers.

For a few days after the thesis was uploaded, various mathematics forums were quiet.

Other than the occasional “What’s the update?”, there weren’t any discussions happening.

This was how professional forums were, nutty people didn’t have time to post on forums all day.

The really nutty people didn’t even have time to visit the forums.

People that could do so were trying to understand the thesis, and people that couldn’t do so were watching from the sidelines.

After all, the people that couldn’t understand the thesis were afraid to speak and embarrass themselves.

It wasn’t easy to read a hundred-page thesis in a short amount of time.

Plus it was a new and unfamiliar L Manifold method…

Even Tao Zhexuan, who was proficient in almost all areas of mathematics, spent two full days reading the thesis.

Tao Zhexuan turned on his computer and couldn’t wait to update his blog.

[He adopted an unconventional research pathway and used a differential manifold to bridge the gap between partial differential equations and topology. This kind of research is so clever that it reminded me of the thesis on fixed point theorem written by Mr. Braun…

[I can’t say for certain that his proof process is correct. I can only say that for the time being, I cannot find any mistakes. I will later write a more professional post to analyze his thesis and the research ideas he used…

[Of course, even though he has most likely succeeded, I still have a lot of questions that I want to ask him. The Navier–Stokes equation is an interesting topic which I’ve also been researching for a long time. Unfortunately, I haven’t been able to solve it. Thankfully, there are people smarter than me in the world.

[Fortunately, I managed to book my ticket on the 30th! I look forward to the end of the month! :)]

…

Finally, the second week after the thesis was uploaded, the discussion about the Navier–Stokes equation exploded.

Several big names in the academic community expressed their opinions, and their voices spread like wildfire. The news even spread to other fields, like physics.

Shuimu University's forum, Navier–Stokes equation post.

[I just want to know if God Lu succeeded? Is there a mathematics god that can tell us?

[Mathematic gods are useless, and normal people can't understand God Lu's thesis. Today our professor told us in class that the Qiu Chengtong Mathematics Research Center organized a meeting last week for professors that are in the fields of the partial differential equation, differential geometry, and topology. They all began to research on God Lu's thesis.]

[Is there a result?]

[How the hell would I know? They won't tell me the results. However, I read Tao Zhexuan's blog, and it seems like God Lu's thesis is nutty.]

[So many gods…]

[Nutty! Navier Stokes equation, Millennium Prize Problem… If he solves this, he must get in the Thousand People Initiative, right?]

[Pfft, Thousand People Initiative! He's a first-level State Natural Science Award winner! Are you joking?]

[Screw it, I'm going to Brazil. Not traveling, not watching football, I just want to touch God Lu…]

[I want to go as well.]

Time slowly passed by, and it was finally July 31st.

Tomorrow would be the opening ceremony of the International Congress of Mathematicians…

But for most people, this world-class event had already begun.

Chapter 420: World-Famous Event

Morning of July 31st, 2018.

Rio de Janeiro, Brazil.

Mathematicians from all over the world gathered here for the International Congress of Mathematicians.

Although the official opening ceremony of the conference was tomorrow, the parking lot outside the Barra da Tijuca Hotel was already crowded.

There was only one reason.

The upcoming report on the “Navier–Stokes equation” would be held in the main conference hall. Professor Lu Zhou from the Princeton Institute for Advanced Study would report on his latest research progress.

Box..

For many people, this report was more significant than tomorrow’s opening ceremony.

It wasn't only because of the million dollars reward.

But because it was the beginning of a new era…

Although the organizers of the conference provided rooms for all of the invited scholars as well as some of the scholars that applied, the rooms were limited and not everyone had accommodation.

Most of the attendees, who came here, came at their own expense, and they would stay at a nearby hotel or motel.

Some of these people were university professors or researchers from research institutes, some were PhD students coming with their supervisors, and some were tourists that wanted to see the academic vibe.

Many universities with highly ranked mathematics programs often organized group participation activities. They might choose some strong genius students from their school who would attend the conference with their professors.

After all, this conference only happened once every four years. Even if they couldn't understand anything in the conference, they could still broaden their views of the world which could pave their future academic career path.

7 a.m.

A tourist bus stopped at the entrance of the hotel.

Several young Chinese students followed their professor's lead and walked off the bus. They then gathered in front of the hotel entrance.

These students were from Yan University, and they were all considered genius students.

The professor who led the team was even more impressive.

He was considered a leader among young Chinese scholars. Professor Xu Chenyang was a millennial and an expert in the field of algebraic geometry; he also won the Ramanujan gold award in 2016.

There were five Chinese scholars that were invited to do a 45-minute report at the International Congress of Mathematicians.

And Professor Xu was one of them.

This time, Xu Chenyang and another professor were asked by the head of the mathematics department at Yan University to take these students on a trip.

Coincidentally, since this world-famous conference was just around the corner, Xu Chengyang didn't plan on missing the conference, and therefore, he brought his students along. Even though they might not be able to enter the lecture hall, but Xu Chengyang said it would be interesting just to watch from the outside.

A boy with glasses looked at the people coming in and out of the hotel lobby. He then looked at Professor Xu and asked, "Professor, have you read Professor Lu's thesis?"

Xu Chenyang nodded and said, "I've read a bit, but I'm in the field of algebraic geometry, and I don't know much about partial differential equations."

Another girl asked, "Do you think he will succeed?"

"I don't know," Xu Chenyang replied honestly as he shook his head. He then said, "There is no universal conclusion on Professor Lu's thesis. He used a very novel approach and new things are often controversial."

The guy with glasses asked, "Is it even more novel than abstract proof?"

Xu Chenyang raised his eyebrows and looked at his student before he asked, "You know about abstract proof?"

The guy in glasses smiled and scratched his head as he replied, “I read some documents in my spare time.”

“You’re pretty impressive. Partial differential equations is a promising field, and it has a high potential, both in applied and pure mathematics,” Professor Xu said with a smile. He was about to explain the difference to his students when he heard a familiar voice.

“Xu Chenyang, how are you?”

Xu Chenyang looked toward where the voice came from. When he saw the owner of the voice, his eyes lit up, and he reached out his right hand.

“Brother Zhang, long time no see!”

The student in glasses instantly recognized Professor Xu’s friend.

“God Wei!”

The other students heard this name and looked at the man in awe.

God Wei!

Yan University only had one God Wei—Zhang Wei!

Everyone who came from Yan University knew about Zhang Wei.

29-year-old Ramanujan gold award winner, 34-year-old Columbia University tenured professor, 35-year-old Morningside Medal of Mathematics… He and God Yun were the idols of Yan University.

Zhang Wei smiled friendly and looked at Brother Zhang.

“Why are you here so early? It doesn’t start for another two hours.”

Xu Chenyang smiled and said, “Aren’t you the same?”

Just like Xu Chenyang, Zhang Wei also had a 45-minute report at the conference.

They brought these students into the conference hall and agreed on a time and place to meet up later. The professors then walked into the main lecture hall together.

Along the way, the two didn’t actually talk about the Navier Stokes equation. Instead, they talked about tomorrow’s opening ceremony, and tomorrow’s main event—the Fields Medal.

Xu Chenyang said, “Is there any hope this year?”

Zhang Wei sighed and said, “There are too many nutty people, it’s difficult.”

The youngest rank W3 German professor and the youngest Princeton professor; these two were no doubt the strongest contenders.

Everyone else was no match for them.

The other contenders were no ordinary people either. If last year’s Fields Medal contenders were uncommon people, then this year’s contenders were people that were uncommon among uncommon people.

Zhang Wei looked a little depressed, and Xu Chenyang didn’t know what to say. He tried to comfort him and said, “You’re God Wei, how can you not be confident?”

Zhang Wei stood in front of the lecture hall entrance, and as he stared at the crowd, he smiled and shook his head.

“Let’s drop that name…”

Who here isn’t considered a god?

…

At exactly 8 a.m…

The venue was so fully packed that even the aisles were crowded.

Although there was still an hour until the report officially began, the venue was already completely full.

In addition to the scholars that were participating in the conference, there was also a row of cameras attached to the walls of the venue.

There had been many people that tried to challenge the Navier–Stokes equation, but very few had succeeded.

If this challenger succeeded, then these cameras would capture this historic moment. The media would never miss a moment like this; several famous museums even brought their own cameras.

Vera sat in the back row of the lecture hall. As she looked at the stage, she took a deep breath in order to slow down her heart rate.

Although her report was in two days, she was more nervous than ever.

“… You got this.”

Vera tightly squeezed her hand as she prayed for Lu Zhou in her heart.

Suddenly, an old man came over and sat next to her.

“You’re worried about him?”

“…”

Vera looked at this old man in surprise.

Pierre Deligne!

Her supervisor’s supervisor…

She met this old man a few times at the Princeton Institute for Advanced Study.

Her impression of him was that he was the type that rarely laughed and barely spoke to people.

Deligne looked at the lecture stage as he said, “There’s nothing to worry about. After all, he’s my favorite student.”

A condescending voice came from the side.

“Are you not embarrassed to say this? You only taught him for a few months.”

Deligne could tell from the arrogant voice which friend it was.

He smirked and looked at the man.

“You’re here as well?”

“What a strange question, how could I not come?” Faltings sat next to Deligne and said, “If someone is bullsh*tting on stage, someone has to point it out.”

Vera looked at him with dissatisfaction.

However, she was too small and weak, and no one noticed her.

Deligne only smiled lightly.

“I’m afraid you’ll be disappointed.”

Faltings raised his eyebrows. “You’re that confident?”

Deligne: “Do you want to bet?”

Faltings stared at his old friend for a while and didn’t respond. He then looked at the stage and said, “… It’s about to begin.”