

An Interview with Prof. Swadhin Pattanayak

by Gonit Sora - Wednesday, April 03, 2013

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Prof. Swadhin Pattanayak is the founder director of the Institute of Mathematics and its Applications (IMA) at Bhubaneswar. Apart from being a very good mathematician, he is also an inspiring teacher. At present he is a professor of mathematics at IMA. Prof. Pattanayak was on a short visit to Tezpur where he was kind enough to give us an interview which is produced below verbatim.

The interview was taken by Parama Dutta, Nilufar Mana Begum and Manjil P. Saikia with assistance from Pranjal Pratim Borgohain, all students of Tezpur University.

1. You have had a long and distinguished career in mathematics, what motivated you into taking up mathematics as a career?

Many things have motivated me towards Maths. One such was I really liked Science and scientific experiments. In the process of learning Physics , Chemistry I found the broad uses of Mathematics. But that was quantitative and it worked but didn't work to the extend it should have worked. That was in high school, and gradually I began to realize that I need to know more mathematics to understand these things. Although I have an equal interest in mathematics, but for learning physics properly I came into mathematics.

2. Was there any particular inspiring teacher?

Yes, there were many. There was Prof. Ramanath Mohanty and then there was Prof. Siva Prasad Mishra. Prof. Mishra encouraged me to learn physics although he was a teacher of mathematics. These were the two people who encouraged me deeply.

And there was self-study. I read and read and read. There was hardly any book in the library which I haven't read. If I didn't understand something, then I read the required things. Most of the things I learned myself, because if you ask others than they might not have the time to give you.

3. How do you think mathematics influences today's world?

Mathematics is certainly very useful. Every missile you launch, every aircraft you build, every encryption you do, every coded message you send there is very powerful mathematics involved. Then there is the design of aircraft which involves a significant amount of mathematics. There is the mechanical part and then the aerodynamical part. The aerodynamical part requires a lot of mathematics.

When I did my PhD I wanted to find out a class of operators which is a very abstract thing. But the way I did it, I found out some methods to determine when would these operators be invertible. And I left it at that. But ten years later I found that electrical engineers, electronics engineers and control engineers were using some of my tools and said that this new method was quite useful to them.

4. You have been actively engaged in research in Probability Theory, Relativity, Fourier Analysis and Functional Analysis. Can you tell us in brief about your research?

See this is interesting. I never learned probability when I was in India or when I was in US. I was once looking at some work of my friend and then found some mistakes in his work. In this way I started learning probability and then guided a few students. My original work was in functional analysis. Since I liked physics so I also worked on areas which lies in the border of mathematics and physics.

5. What kind of specific problems that you worked on?

One is on operator theory, and then finding out some geometrical meaning in analysis. Then there is quantum mechanics and trying to understand in terms of general relativity. Not many people have given answers and I have been also trying that.

6. Amongst all your achievements, which one do you feel is the most significant?

The most significant I would say is that many students have taken up mathematics after coming into contact with me. They thought that they would not be able to do research, but have since then made a mark as some of the best researchers. One of my students, Gadadhar Misra of IISc, Bangalore has also won the Bhatnagar Award. So I would say that I have been able to enthuse students into Mathematics and that is a significant achievement.

7. What was your motivation in establishing IMA?

Well this that is to one of them is to encourage research and to search and nurture talent. That's what we have been doing so far. We guide research and encourage other researchers to visit us. Young undergraduates from places like Guwahati and Pondicherry also visit us to do summer research. We also encourage school students into mathematics, we organise two-week camps in IMA and encourage them to solve problems at their level like Olympiad problems.

Besides that we wanted to have a good library and the IMA library now is one of the best libraries in India today.

8. Were there anyone who helped you in this effort?

Yes there were many people.

9. Do you think your motivation in forming IMA has been successful?

Well its hard to say, because it's just 15 years now, but the fact that IMA is making a mark in India has been encouraging. Although not to the extend but still I am happy. Now the IMA will be going to merge with the ISI and then we can have things which now we cannot have.

10. We have seen that most students in India do not opt for mathematics as a career choice. What do you think is the reason behind this? Is there a dearth of facilities in India for mathematics?

Well, one of the reasons is that they go for softer options like going to engineering. But to make good engineers we need good mathematicians which we do not think about in India. We have so many IITs in India, the first came in Kharagpur in 1951, but tell me one technology that developed in India. All the steel plants that came in India have been using foreign technology like German, Japan and Russian. Even the ubiquitous mobile phone that we are using is Finnish (Nokia). If you really need to develop great technologies, we need good mathematician.

It's a chicken and egg problem. I know many good places cannot offer courses because of a non availability of teachers.

11. How do you compare the mathematics education student in other countries to that of India?

Our education is a bit backward compared to what is happening in the other countries. Why is it that we have to read at masters level what others read at undergraduate level? We are behind by at least 20 years in most areas. We need to refurbish our curriculum. To refurbish our curriculum we need good teachers. At some stage some teachers have to take courage to learn new things and instil it into students, that is what I did before I went to Stony Brook.

12. What is your advice to young students of mathematics?

The first thing is try to see if you like it or not. Then you must try to solve problems, you can take help if you are stuck. But you must enjoy mathematics. It is not isolated like algebra or analysis, but its binding and is deeper and beautiful. You must be courageous in trying to solve hard problem.

13. It has been noticed that mathematics is feared very much amongst the common people. Is there a way to remedy this?

That is very unfortunate. It is not only in India but even elsewhere. Math is one of the most natural sciences that developed. From primitive times math has been developed by man for his use. It is a natural gift of man and should be followed to blossom and not be forced into the ground. We must make children enjoy math.

14. Apart from mathematics, what other things do you enjoy?

I like history and also to work for people. That is why I try to help children who are economically or socially backward. I am not saying that I was very successful, but I like to help them.

15. What are the scope of mathematics students after their master's programme?

There is for sure PhD program. Within India, at least for now there are many places where you can do a PhD. If you want to take Computer Science as a career then you can do MTech in it after your MSc. Then we have DRDO that recruits people with Masters degree in Math. They recruit you as Scientist B and then promote you to C,D, etc up to I, according to your work. If you are working there then you will be asked to use your skills to develop new methods of guiding and tracking missiles, and tracking and decoding encoded messages. Your former president Dr. A. P. J. Abdul Kalam was a scientist at DRDO. If you have good aptitude for math then you can go to DRDO.

16. it is seen that nowadays more focus is given on the college and university level math education, don't you think that school level math education should also be taken into account?

Yes, that is true. There is International Math Olympiad. China is coming first if you look in the last 10 years. India's position is very low, even Iran is above us. This is because we do not give too much emphasis in school level, but Chinese do that.

17. It is seen that in the transition of school to college and then college to university students fail to appreciate mathematics. Why does that happen?

It is because we never make students learn how to enjoy mathematics. We tell them only how to fear math. Usually math is associated with a cane. With that we can never do good math at the school level.

18. How do you compare an Indian math student to a student abroad?

I can tell you my own experience. When I went to US I found that I was very backward, but within a couple of weeks I was the frontrunner. It is not that we are not talented. Many thing I did not know then, but I learned them on my own, solved problems all by myself and then beat everyone in my class, Indians, Americans and Chinese.

19. Is this your first visit to Assam?

No, I have visited many times. I came first way back in 1993. I have come to Guwahati many times, but to Tezpur this is the first time. The Assamese people are very hospitable and I enjoyed this visit a lot. I would like to come back again if possible and I find a lot of cultural similarity between Assam and Orrisa.

20. Your comments on Gonit Sora?

I wish it all success, and I wish it helps children to learn more and like mathematics. And maybe Assam will have India's first Fields' Medallist.

We thank Prof. Pattanayak for giving us his valuable time.

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