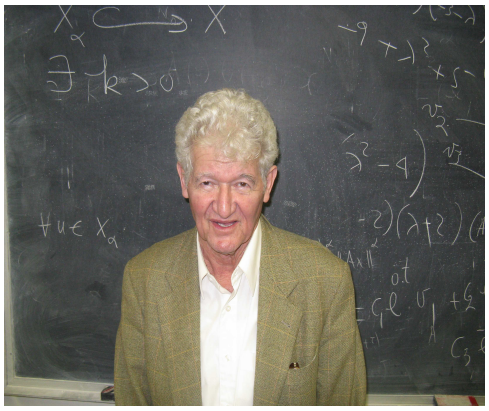
Communications in Mathematical Analysis
Special Volume in Honor of Prof. Peter D. Lax
Volume 8, Number 2, pp. 1–4 (2010) *www.commun-math-anal.org*
ISSN 1938-9787

INTERVIEW WITH PROF. PETER D. LAX

TOKA DIAGANA*

1 Peter D. Lax

Peter D. Lax was born in Budapest, Hungary and because of horrible consequences of World War II, he moved to New York in the early forties along with his family [3]. After receiving his PhD degree in Mathematics, in 1949, from Courant Institute, New York University, he joined the Los Alamos National Laboratory. He returned to Courant Institute only in 1956 as a faculty and has since spent the rest of his professional career there.



Peter D. Lax - Howard University - April 2009

"In the world of modern mathematics, Dr. Peter D. Lax, professor emeritus at New York University, ranks among the giants", as the *New York Times* put it [1]. His work has helped reshape many areas of pure and applied mathematics and beyond. He authored many groundbreaking contributions ranging from partial differential equations and their applications to computational fluid dynamics. His name is associated with many significant mathematical results such as the Lax-Milgram Theorem, Babuška-Lax-Milgram Theorem, the Lax Pair, the Lax-Friedrichs Scheme, or the Lax Equivalence Theorem, etc.

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Peter D. Lax received many honors and awards throughout his rich career. In 2005, he received the *Abel Prize* [2] for his *"groundbreaking contributions to the theory and application of partial differential equations and to the computation of their solutions"*. In 1986, he received *The National Medal of Science* from the hands of *President Ronald Reagan* during a ceremony at the White House. Other honors and award Lax has received include, but not limited to, the *Chauvenet Prize* in 1974, the *Norbert Wiener Prize* in 1975, the *Wolf Prize* in 1987, and the *Steele Prize* in 1992.

This Interview is a part of the Special Volume of Communications in Mathematical Analysis in honor of Prof. Lax. All the Interview questions were prepared and composed by T. Diagana with the imperfections they might be subject to. In it, Prof. Lax provides the reader answers to our questions ranging from his early education in Hungary to boundaries between pure and applied mathematics. There is no doubt this Interview will help us better understand the work and the vision of Peter D. Lax.

2 The Interview

First of all, I would like to thank you so much from the bottom of my heart for not only accepting my request to interview you within the framework of the ongoing special volume of *Communications in Mathematical Analysis* in your honor but also for your strong and continued support for *Howard University Mathematics Department*. Needless to say I am very pleased and honored to have this interview with you.

Diagana: I thought we could for instance start with your education. Can you please describe your early education? And when did you find out that you might become a mathematician?

Prof. Lax: Like many mathematicians, my interest in the subject came early. My uncle, who knew a lot of mathematics, was the first to answer my questions.

Diagana: As you know there are many famous mathematicians who are from Hungary such as Frederick and Marcel Riesz, Alfréd Haar, George Pólya, Gábor Szegö, John von Neumann, János Bolyai , Paul Erdös, Raoul Bott, László Lovász, etc. This is certainly not a coincidence. How would you explain this fact? Was there a particular way of teaching mathematics in Hungary? And if so, what is it?

Prof. Lax: The Hungarian mathematical community was always on the lookout for talented youngsters, and saw to it that they received advanced training. I was tutored by the distinguished pedagogue Rose Peter; her book, *"Playing with Infinity"*, is the best math book for laymen. I also received mathematical advice from Dénes König, who created a theory of graphs out of a collection of distinct results. When

I came to the United States, Paul Erdös stimulated me with many conversations and problems. I also learned a lot from Szegö during a summer semester at Stanford University.

Diagana: When you moved to New York, what were your first impressions of the way mathematics was taught in the United States back then?

Prof. Lax: When my family and I left Hungary, in 1941, Rose Peter and Dénes König wrote to von Neumann and to Szegö to look after me, and they did. Szegö recommended to my father that I study with Richard Courant, for he is very good with young people. This was the best advice. So I only received advanced training.

Diagana: In your opinion, how should we train mathematicians of the future?

Prof. Lax: We should be on the lookout for talented youngsters and make sure that they receive advanced training. We should also make sure that mathematics teachers in grade and high school are well trained in mathematics, and not just pedagogy. We should use new better ways to present mathematics in High School, and introduce new material, such as linear algebra in 2 and 3 dimensions.

Diagana: Let us now talk a title bit about your research. I am sure many people including graduate students will be interested in your answers to the question I am about to ask: How do you select your research topics? When you make that determination; how do you proceed to deal with the problem you chose to work on?

Prof. Lax: It is hard for me to answer this question; the selection of problems is done by my subconscious. It was very helpful to me to be at a center of mathematics, The Courant Institute, where I learned about so many new developments.

Diagana: How do you prove Theorems? I mean, how do you proceed?

Prof. Lax: By thinking about them constantly.

Diagana: What is the Theorem you like the most? And why?

Prof. Lax: I like many of my results, because they are surprising.

Diagana: : Needless to say all your papers are "chef d'oeuvres" though, what is your paper you like the most? And why?

Prof. Lax: I cannot answer that; I like all my children.

Diagana: You are a great source of inspiration for both pure and applied mathematicians all around the world. How do you view boundaries between pure and applied mathematics now and in the future?

Prof. Lax: The difference between pure and applied mathematics is that in applied mathematics you have hints from experiments, including numerical experiments. The technical differences are not that great, similar to the differences between two branches of pure mathematics.

Diagana: When I was a graduate student in France; I remember meeting with one of those great mathematicians who then advised that I avoid working on conjectures. Would you say the same thing to graduate students?

Prof. Lax: That is good advice. It is better to invent your own problems than solve those posed by others.

Diagana: Thank you so much, Prof. Lax, for your time and efforts in answering our questions.

Acknowledgments

This Interview couldn't have happened without the efforts of Prof. Louise Raphael who, a few years ago, introduced me to Prof. Peter D. Lax. So I would like to thank her for that. Moreover, I would like to thank Prof. Francois Ramaroson for having proofread all the versions of the Interview.

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