LOOKING TO THE EASTERN EUROPE MATHEMATICAL COMMUNITY

INTERVIEW[1] WITH ROLF JELTSCH, THE PRESIDENT OF EMS

Interview by Vasile BERINDE

Question 1. First, could you explain what EMS is, what are the aims of EMS?

Answer: The EMS has been founded in 1990. It has a double structure in the sense that it is a society of societies but also of individual members. It consists of about 50 member societies which cover all of Europe from Island to Georgia and from Norway to Israel and Portugal at the southern end. The main objectives are strengthening the feeling of a European identity among mathematicians, functioning as the European partner in mathematics for the European Union and for outside of Europe and nurturing relations between the mathematical community and society as a whole. Subject wise we cover all of mathematics, pure and applied up to and including industrial applications.

Question 2. What do you personally want to achieve as president of EMS during your term of office?

Answer: I think that I was chosen as a president because most of the founding societies have been inclined more towards pure mathematics than to applied mathematics. Hence one of my major goals is to show to the applied mathematics community that EMS does care for this field and can be their home. For this reason I was happy that we could introduce the

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Felix Klein prize which is given for using mathematical methods to give an outstanding solution to a concrete and difficult industrial problem. Last year EMS organized the first conference devoted to applied mathematics an applications of mathematics. In addition it was the first EMS-SIAM meeting. We shall have as a follow up the first conference EMS is doing jointly with some of its corporate societies, in this case the two French societies, SMAI, Société de Mathématiques Appliquées et Industrielles, and the French Mathematical Society, SMF. The title of this event is 'Applied Mathematics - Applications of Mathematics' and it will be held in Nice, France, 10-13 February 2003. As with the EMS-SIAM conference we are hopeful to get funding from the EU so that we can support young researchers not older than 35, from all member and affiliated states of EU. Clearly my concern is to make this opening up of EMS towards applied mathematics to become permanent. Therefore I called for a brain storming weekend in Berlingen in Switzerland to discuss this matter. As a result the so called Berlingen declaration was made, which you can find on the web http://emis.de.

What else do I want to achieve? In recent years prices of journals increased well above the usual rate of inflation and there seems to be no end to the strategy of commercial publishers to continue with these price raises. As an alternative EMS has started a publishing house. This will be a nonprofit organization which is run by professionals. The managing director is T. Hintermann and I would like to make sure in my last year of office that we can start with two book series as soon as possible and with a small number of journals in 2004.

Last year the Portuguese Mathematical Society made an initiative and suggested regional meetings corporate member societies are doing jointly together with EMS. This initiative comes really at the right time, because it looks like in the 6th Framework program of EU there might be the possibility that EMS could do a bulk application for supporting conferences. Hence we have to set up procedures for dealing with such conferences on a scientific level as well as on the technical level. An ad-hoc committee is currently discussing these matters. I do hope that by the end of my presidency we have the basic structure set up. There are two more projects we are currently working on, but these will have to be continued by my successor. One is to join in the world effort to digitalize all old mathematical information. Again in the 6th Framework program there is the possibility to support such an endeavor. We need to motivate a few member states to contribute too and this can be used to trigger support from EU. This is truly a task only EMS can do.

With the same type of EU funding we would like to distribute the financial burden for the important database Zentralblatt MATH to many more European countries and the EU. Up to now the major financial burden rested with Germany. These four topics, the EMS publishing house, the EMS policy on meetings, the digitalization and the European support

for Zentralblatt MATH, can be seen as a general push to improve the infrastructure for mathematics and this will be discussed in a brain storming weekend in Berlingen this coming April.

I am trying to be a president which is close to the corporate member societies and to his individual members. For this reason I started with writing an annual letter each year. In my opinion this did increase the cooperation with our member societies. I wanted to be able to increase the number of individual members quite dramatically. This did unfortunately not happen. I still want to devote my energy to get more members during this year and I do hope that this interview will motivate some of your readers to join.

Question 3. How do you think could be increased the role and interest of Eastern European Mathematical Societies and individual mathematicians in EMS and its activities?

Answer: This is really a very difficult question. Concerning increasing the role and interest of Eastern European Mathematical Societies I try to visit as many conferences in Eastern Europe as possible. Last year I was in Bulgaria, Rumania and Ukraine. This year I will be in Estonia, in Poland and again in Rumania, this time in Baia Mare. During these visits I am trying to listen to the needs of the local mathematicians. I have been impressed by the amount and quality of Mathematics which is done in these places, the enthusiasm to continue to work despite adverse conditions. Unfortunately, I have also seen that conferences are misused as a personal money making machine, which did not help the local mathematicians.

In the above mentioned Berlingen brain storming weekends my institution ETH generously pays for the local expenses. This made that some colleagues from Eastern Europe could participate. Their active participation is very important.

Sadly enough, I have to say, that economic hardship in Eastern Europe takes to much effort of our colleagues, so they can not invest as much energy in EMS as they would want too.

Concerning the input of corporate societies and form individual members I have to say that both groups have there share. In the Executive committee we have excellent people working together with me, some became involved as council members representing individual members and some as representatives of member societies. Once they are in the executive committee they work for the mathematical community as a whole and do not act as representing a corporate society or a special interest group. Hence I feel both type of memberships have their share in the influence.

Question 4. The term of "equality of chances" could be implemented by EMS amongst European mathematicians (in a large sense)? How?

Answer: This is again a difficult question. As I mentioned above, economic conditions make already up for a large imbalance of the chances. However changing the economic situation is well beyond the power of EMS. What we can do, and this we are successfully pursuing, is that EU funding is opened up to as many mathematicians as possible, especially in economically dis-fortunate regions. In a first step we can already support conference participants from all affiliated states. This includes already many, but not all, Eastern European states. Since the EU commissioner for research, Ph. Busquin, wants to create an European research area we use his intention to promote that visitors from outside of EU member and affiliated states can be supported. This of course includes the other Eastern European states.

Question 5. What is your opinion about the direction in which the current brain drain affects East European countries, and especially Romania (see EMS Newsletter, June 2001, page 22)?

Answer: I have seen an extreme brain drain in Bulgaria, where in some mathematics departments the youngest professor is well over forty years old. I think that this is a very bad situation. What happens is that if a person wants to stay in mathematics and pursue an academic career, she or he leaves the country for economic reasons. This is typical for many eastern European countries. In addition, and this phenomena occurs in Western Europe and in the US equally well, young people are very often no longer motivated for doing mathematics because there are other challenging careers with better salaries. Computer science is an extreme competitor to mathematics and in USA in addition to the rising of the so called new economy, high salaries of lawyers take their toll. In recent years all my Ph.D. students left immediately academia, once they had their degree.

Question 6. Knowing the Romania's merits in mathematics competitions for high school and university students, what do you think about establishing a EMS Committee for Mathematics Competitions?

Answer: This is a good question and I have to admit that I never thought about it. My first reaction is to say that there is the Mathematics Olympiad and as far as I know students form Eastern Europe do extremely well. I am not that familiar with the Mathematics Olympiad but I think setting up other competition makes only sense if the profile of this contest is distinct from the Mathematics Olympiad or similar events. I think, I should discuss this idea with my colleagues from the executive committee and with the chair of the education committee.

Question 7. You recently visited Romania, on the occasion of ICNODEA at Babeş-Bolyai University in Cluj-Napoca. What are your impressions about the education and research achievements? What do you suggest it could be done in order to improve them and to enhance collaboration with West European countries?

Answer: I was very impressed by the level of talks I could listen too. Especially I heard from young ones some really good work. I have however not gained enough insight in the educational system to make suggestions. I saw some examples of young researchers holding some position in a western country and being willing to partly teach and do research in Rumania. Clearly it would be just easier for the person to stay in the West and not take the burden to also work in Rumania. I think these people are extremely important to set an example for the even younger ones to show that there is a future in doing mathematics. I think that it is important that the financially strong governments in Western Europe and the European Union do offer opportunities for the young ones from Eastern Europe. However they have to give an incentive to move back to the country of origin. For this reason EMS has pushed successfully for a program where to a young researcher support is given for working two years in an institution in the west and she or he is supported for an additional year which has to be taken in the country of origin.

Question 8. Do (did) you meet in Switzerland, Romanian students? What do you think about their mathematical inclination and abilities?

Answer: Yes, I did meet Romanian students. In fact, we have two of them in our Seminar for Applied Mathematics. They are working with my colleague. Fortunately, I can say that both are both excellent and very devoted otherwise it would be difficult to answer your questions without breaching privacy since they are of opposite sex.

Question 9. What is your opinion about the direction in which the relationship mathematics-society awareness is going nowadays in your country, in Europe and the world?

Answer: Unfortunately, I have the feeling that currently in most countries in schools the number of hours for mathematics is reduced. It definitely is like this in Switzerland. This is a bad situation, because with the spreading of computer with the ever increasing computer power more and more things are done with computers. However whenever you want to compute you need to have a mathematical model and hence we need more and more persons with an excellent knowledge in mathematics. I think that what we basically do wrong is that we do not educate the mathematics teachers well enough. A teacher should first of all know the mathematics and have experienced the fun and beauty of it. Unfortunately, due to reduced hours of teaching one often concentrates on 'mechanical' work rather than of training imagination. Usually in primary and secondary school we never show a student an unsolved problem. Even at Universities non mathematicians are not exposed to unsolved problems. Hence, many people leave Universities with the idea, mathematics is uninteresting and everything has been solved. Next to improving the education of mathematics teachers one should try to

raise the public awareness for mathematics. The World Mathematical Year 2000 made in this direction an excellent contribution and this is why EMS has introduced a new committee to continue this work.

Question 10. Tell us about your field of research. What can be found from this in your priorities as a president of EMS?

Answer: When I started my studies at ETH all I wanted to do is prove theorems. Then after four semesters one had to decide in which particular direction one wanted to specialize in. I was hesitating between the mathematics represented by B. Eckmann and applied mathematics. I did choose applied mathematics not because I loved it, in fact I dislike the inaccuracies of computer arithmetic, but because I felt I could help other people solve their problems. In the 70's and early 80's I was lucky to be able to take part in the dramatic expansion of the theory of numerical schemes to solve initial value problems of ordinary differential equations. However I felt in the end, that we started to do theory at its own right, rather than solve problems for other people. Hence I changed to solving numerically hyperbolic conservation laws. A typical example is the simulation of hypersonic flow using Euler equations of gas dynamics. I was especially motivated by a colleague form fluid dynamics. The European Space Agency ESA had started the project HERMES to build a reentry vehicle similar to the space shuttle. It was fascinating to work in this European competitive program and to be motivated by the idea that HERMES would actually fly. As you know the fall of the iron curtain changed the space flight priorities of Europe and hence the program was abandoned. The problem with the numerical solution of hyperbolic conservation laws is, that one is not able to prove a lot. Existence and uniqueness of solutions in two and three dimensions are still not proved and hence one can not prove convergence or give bounds for the errors.

Of this, what can be found in my priorities as president of EMS? I think most importantly is my believe that we need both, pure and applied mathematics. Some of my proofs are using Riemannian manifolds and I still need some deeper insight there to prove a conjecture which I believe to be true and as indicated above, we still need a good theory for the solution of hyperbolic conservation laws. Hence keeping the unity of mathematics has my highest priority. I want to prevent that one field tries to dominate the other ones either by saying 'our mathematics is deeper and thus more important' or 'our mathematics is more applied and thus brings in more funding'. Unfortunately, I have heard both statements.

The other priority is that EMS is here to help mathematicians.

Question 11. What are you working on right now? Plans of future?

Answer: I have now moved to the more difficult Magneto-Hydrodynamical equations. In addition I have several students working on hard computational problems, such as 3 dimensional simulation of particle beams in accelerators, optimal design of interior flow devices, such as a diffuser of a gas turbine, large eddy simulation combined with combustion or the application of modern methods from computational fluid dynamics to programs for computing the global weather.

Question 12. What is your attitude to teaching and mathematics education?

Answer: All my academic life I have been teaching next to do research. I think teaching and research have to go together. I personally would not like to work in a pure research environment without teaching. I do love the contact with the younger generation. However, what I really don't like is the written exams we have to do due to the number of students. Concerning mathematics education I already mentioned before what I feel is bad about some of our teaching.

Question 13. A few words about the mathematics education system in your country?

Answer: Well this is a really difficult question. Switzerland consists of 26 cantons, each has its own education system. Depending on where you live, you go 4 to 6 years to primary school. Then you either enter for 2-3 years a secondary school before going to a high school or you enter a so called 'long' high school curriculum. On the average students which go to a profession leave school at the age of 15 to 16 years. EMS made a study which was called 'reference levels for the 16 years old'. The Swiss systems is explained there in much more details. If one goes to university one finishes high school at the age of about 19 years. Currently this age is lowered by about half a year by shifting the exams form January to August. In high school one can choose a more scientific curriculum and within this the choice is between mathematics/ physics and chemistry/ biology. At the moment it is difficult to see how the shortening of the high school education and the newly defined choices of subjects is going to affect the number of students who want to study mathematics and what level of knowledge they bring with them. On the university level, again the universities differ by cantons and hence differ a lot. Only the Federal Institute of Technology is a federal institutions. It has two campuses: ETH in Zurich and EPFL in Lausanne.

Question 14. Do you know the centennial journal of elementary mathematics, Gazeta Matematica? A few words addressed to young people interested in mathematics, the readers of Gazeta Matematica?

Answer: I am sorry, now I really feel bad. I do not know the Gazeta Mathematica! Apparently it is directed to young people interested in mathematics. What should I tell them? I did mathematics because I liked it,

not because of any career I had in mind. So my message would be, if you like it, do it! One is most successful in the field one likes most. In addition we need many mathematicians, today even more than in my time, with all the computer applications. I think one can be confident to build a career on mathematics.

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