

ESF RESEARCH CONFERENCES

Rapporteur Report

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| Partnership: | ESF-EMS-ERCOM |
| Conference Title: | Completely Integrable Systems and Applications |
| Dates: | 3-8 July 2011 |
| Chair: | Gerald Teschl |
| Rapporteur: | Alp Eden |

General Comments

Any general comments you might have concerning the conference, your role, the scientific area covered by this conference, etc.

The conference announcement in www.esf.org/conferences/11369 forms the starting point of my evaluation. This was my first such assignment in an ESF supported activity as a Rapporteur. I am more interested in dynamical systems approaches to dissipative and dispersive PDEs. I use function spaces and functional analysis tools to analyze the qualitative behaviour of solutions. Therefore my background was slightly transversal to the Riemann-Hilbert problem and its various ramifications.

Due to a miscommunication, I gave the presentation about ESF at the forward look session on Thursday. During the conference only few of the participants knew my function, including the organizers and those that I have tried to get their opinions such as Bona, Louis, Lenells.

Quality of Scientific Programme, Presentations and Discussion

Comments on the balance and scope of the scientific programme, the scientific quality of the presentations and discussions.

The conference organizers announced that they will cover four main areas in the conference:

- 1) Universality phenomena in Random Matrices;
- 2) Universality phenomena in the semi-classical limits of integrable systems;
- 3) Completely integrable initial-boundary value problems;
- 4) Exactly solvable interacting particle systems.

To the best of my observations all of the four groups were represented in the conference but the majority of the talks were delivered on the third topic. More on this will be mentioned in the item on the balance of participants. Most of the talks were very high calibre, with few weaker talks. In particular, three of the poster presenters were upgraded to be short presenter, possibly due to a few cancellations in the category of short talks. These talks did not meet the standards of the conference.

From the original announcement Fokas, Kotlyarov, Kriecher, Pastur, Venakides, Zabrodin did not attend the conference. In spite of their absence I believe that Kharkov group was amply represented in the conference.

According to my notes, there were questions asked in most of the talks. I have attended only 35 out of the possible 42 talks, including all the long talks. It was hard for me to concentrate on so many talks outside of my field. Only few of the talks were open ended, by this I mean about ongoing research projects that leaves room for collaboration Bona, Egorova, Grava, Kuijlaars, Masoero, Srinivasan gave such talks.

Some scattered observations are also in order, if such comments are irrelevant in this report please disregard them. Constantin had only a brief presence in the conference and left the conference after giving his talk. He was going to the conference at Reading as an invited speaker. The status of the Camassa-Holm equation as a viable model or just a passing fashion for shallow waves were only discussed critically in that talk. Mikhailov's criticism of the model was also addressed in this session. The connections with elliptic Whitham equations, Hele-Shaw flow, Seiberg-Witten equations were not present in the talks I have attended. Although there were some physicists attending the conference their talks were not on physical applications. Jiuguang Wang did not attend the conference, also 3 people from Uzbekistan that was in the final program did not appear and did not present their posters. Quispel came only the last day to session 12.

Informal Networking and Exchange; Atmosphere

Was the schedule and the atmosphere conducive to an easy exchange of information? Was there time and space for an informal discussion? Were younger researchers integrated?

The conference took place between 9:00 a.m. July 4th to 8:00 p.m. July 7th. There was a reception on the 3rd that started from 5:00 p.m. and the conference ended with a similar reception at 8:00 p.m. on July 7th. There were 16 long talks (each lasting 45 minutes) and 26 short talks (each lasting 25 minutes). On a regular day there were four long talks in the morning with a half an hour break in the middle and 9 short talks in the afternoon with a half an hour break in the middle. The program started at 9:00 and ended after 18:30. The only relaxed discussion time was during the long lunch break, almost two hours. For lunch participants scattered to various alternatives suggested by the organizers. The periods where people socially mingled best was the social program which consisted of conference dinner, partially supported by the mayor of Vienna; the excursion to Melk that took the whole afternoon of the 6th and the receptions at the beginning and at the end of the conference. By the end of the conference people did start talking more to each other more.

In the integration of the younger researchers to the flow of things the conference organizers were very successful. First of all, there were many talks delivered by academicians that are below 40 years of age on works that they have done with the more senior participants of the conference. Secondly, the younger researchers from University of Vienna were handling most of the preparations during the breaks and were taking charge of the conference. Organizers Teschl and Kamvisis attended to all of the talks that I have attended.

Balance of Participants

Was there an appropriate balance between young and senior participants? Was a balance of national groups and researchers from different (sub)fields achieved?

The long talks were mainly delivered by senior researches with a few exceptions like Srinivasan from Austin. The short talks were also delivered mainly by younger researchers, with notable exceptions like Konopelchenko, Soshkinov and Szmigielski. Also the balance between genders were carefully observed both in the senior and in the junior participants.

12 EU countries were represented in the conference: Austria; Italy; France; Belgium; UK; Czech Republic; Sweden; Norway; Portugal; Spain; Germany; Greece. There were 14 participants from USA and from Austria and Italy 9 each. The next largest group was from Ukraine, representing Kharkov Group consisting of 6 participants. Since 21 different countries were represented one can say that some balance was achieved in terms representation of different nationalities both within and outside the EU.

I can not draw the same conclusion for the balanced representation of the four topics that have been stated above. I believe that Deift's group on Random Matrices was underrepresented, Venakides was announced to come in the original announcement but did not, Baik took his place. However his current research did not blend in well with the completely integrable systems. As far as I can see Baik did not stay for the closing session for open problems as well.

Random Matrices group: Baik; Wang; Kuijiaalars; van Moerbeke.

UK group: Lennels; Pelloni; Mantzavinos; Hitzazis.

SISSA group: Grava; Moro; Wu; Giavedoni.

Kharkov group: Egorova; Sakhonovich; Enolski; Shepelsky; Minakov.

Vienna Group: Teschl; Kamvisis; Michor; Eckhart; Mikikits-Leitner, Grunert

Connected to Vienna group: Holden; Gesztezy; Boutet de Monvel; Egorova; Shepelsky; Nenciu.

Some comments about the interactions are in order: Camassa-Holm equations as a completely integrable equation was a common theme in the conference. For example, Grava from SISSA group talked about the possibility of a universal behaviour of the solutions close to the blow-up time independent of the underlying equations but they have started with the Camassa-Holm equation. Since most of the work they have presented were very new and they were in the process of checking this hypothesis about universality on different equations there was room for a lot of interactions. This was possibly one of the original intentions of the organizers, I have not observed a strong interaction in that direction.

The last three of the above mentioned groups are already well-integrated and that was also the case during the conference, all of them had joint papers with Teschl and some of them talked about their joint work. Boutet de Monvel has very strong connections with the Kharkov school and this group's strongest talk was delivered by Egorova. Egorova's talk was both general and specific in which she was able to review at least three works in some

detail. Due to the illness of Boutet de Monvel, her speech was given by Shepelsky who also gave his own talk. Apart from that occasion Boutet de Monvel's presence in the conference was very strong. Fokas could not come and his talk was given by Lenells who also gave his own talk later on. This arrangement where a speaker, Lenells and Shepelsky, gives two consecutive talks unavoidably reduced the effect of one of the talks.

Outlook and Future Developments

Will new collaborations emerge from this conference? (How) could the conference outcomes be utilized further? Are there suitable (ESF) programmes or instruments to further the work of the conference?

As I have already mentioned above there are already well-developed connections between the last three groups that seems to be active and remained active during the conference. The group on Random matrices did not blend in well with the main core, as well as the group from UK. One possible explanation for this is the early departure of Pelloni who was organizing another conference at University of Reading between 6th and 8th, see http://www.ima.org.uk/conferences/conferences_calendar/nonlinearity_and_coherent_structures.cfm. Her early departure might have been one of the reasons why the UK group did not interact very well with the other groups.

In the forward look session at the end of the conference some open problems were posed by Shepelsky, Kujiliaars, van Moerbeke on one hand and Miller and Bona on the other hand. The latter two stressed the need for a softer approach where the techniques used in the Riemann-Hilbert problems can be generalized to allow applications to more general classes of equations and problems as well as allowing the discussion of the stability under various perturbations. This seems to be a suggestion that is being supported by Deift. Bona claimed that he did not see any applications as advertised. Neither the UK group nor the SISSA group presented open problems at the end of the conference. As far as I can observe, Gavara left the conference early (possibly early Wednesday). As a constructive suggestion, I suggest a mirror conference this time organized in Italy by the SISSA group.

Follow-up

What immediate and long term follow-up would benefit collaborations and dialogues that may have begun at the conference?

The most promising immediate benefit would be to give more chance to the SISSA group to advertise their research program and form collaborations. People working with random matrices are using tools that are foreign to people working mainly on PDEs as examples of completely integrable systems. So the original intention of the conference organizers to bring these two groups together was a noble one but requires an environment where both groups learn each others' techniques by elementary talks.

Organisation and Infrastructure

Were venue, catering and accommodation appropriate for this conference? Were participants satisfied with the on-site administration and support?

The seminars were given in one lecture hall which was large enough to accommodate all of the participants, around 70 people, and coffee and socializing was done in the coffee room. Catering was modest but was appreciated by the participants and I have heard no complaints. There were enough computers available for checking one's e-mail at any given time. All of the participants that I have talked to seemed to have enjoyed the conference and found it useful. Because of the tightness of the conference schedule the participants had to miss some of the talks in order to work with each other.

Summary & Overall Assessment

Was the conference successful; were its aims achieved?

I can easily say that the conference was successful but did not achieve some of the goals it had aimed originally. The interaction between the Kharkov group and the extended Vienna group was strong and organic. The other groups were slightly isolated, UK group was not adequately represented and I can say the same for the Random Matrices group. This conference would most probably be instrumental in strengthening already existing ties but it is not clear to me whether it has helped to form new ones, at least different sides were able to present their results to each other.

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Date: July 14, 2011