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Gennadi Henkin (1942–2016). Some memories

Christer O. Kiselman

Abstract.
Gennadi Henkin (1942–2016) was an outstanding mathematician in the field of complex analysis and geometry, working in Moscow and Paris.

The text is based on a talk at Mikael Passare's Day on 2016 October 05. Every year since 2011 we have honored his memory by organizing a meeting at Stockholm University.

Introduction

Gennadi Markovič Henkin, Геннадий Маркович Хенкин, was born on 1942 October 26 and died on 2016 January 19. Since 1967 he was employed as a researcher at the Central Economics and Mathematics Institute, CEMI, Центральный Экономико-математический Институт, ЦЭМИ, later as Leading Researcher, главный научный сотрудник.[1] He told me that this position had a very high degree of employment security. The duties were research in economics; no teaching. In 1973 he obtained the degree of Doctor of Sciences in Mathematics at Moscow State University, Московский государственный университет имени М. В. Ломоносова, MGU. Gena moved to Paris and was a professor at Université Pierre-et-Marie-Curie, Paris 6, since 1991. For more about his research see the obituary published by Andrei Iordan (2016).

Gennadi Henkin is best known for his work on complex manifolds and especially for his work on integral formulas in several complex variables. Among his many publications, his two books written with Jürgen Leiterer (1984; 1988) have become standard works of reference.

The results obtained by him are too numerous to be covered even superficially in this little essay. It is easier to list some of his awards. Gena received the Prize of the Moscow Mathematical Society in 1970; the Kondratiev Prize of the Russian Academy of Sciences in 1992 together with Victor Meerovič Polterovič, Виктор Меерович Полтерович, for their work in economics, and the Stefan Bergman Prize (named for Stefan Bergman, 1895–1977) from the American Math Society in 2011 for his work in complex analysis.

[1]Since 1991, CEMI has been reorganized as the Laboratory of Mathematical Economics, CEMI, Russian Academy of Sciences, Лаборатория математической экономики, ЦЭМИ, РАН. However, the acronym ЦЭМИ, CEMI, is still used.

As a person, Gena was always extremely kind, helpful, interested in talking about mathematics and many of its applications, and also very modest and even humble.

MathSciNet

In MathSciNet, the online version of Mathematical Reviews, Gena is the author of 128 items; with addition of the items related to him, there are 139. He has many co-authors, among them Pëtr Polyakov (Петр Поляков, Jürgen Leiterer, and Mikael Passare.

The Mathematics Genealogy Project

In the Mathematics Genealogy Project (indicated by MGP in the list below) five doctors with Gena as advisor are listed. In the English version (CEMI in the list) of the web site at CEMI there are eleven; in the Russian version (ЦЭМИ in the list) also eleven but not the same. They include the five in MGP. Adding them all, we get twelve:

1976 A. V. Romanov, Professor, Moscow (ЦЭМИ, CEMI).

1980 Alexander E. Tumanov, Professor, Illinois (MGP, ЦЭМИ, CEMI).

1981 R. A. Airapetian, Professor, Los Angeles (ЦЭМИ, CEMI).

1994 N. Nivoche, Professor, Nice (ЦЭМИ, CEMI; should be Stéphanie).

1997 Tien Cuong Dinh, Professor, Paris 6, now Professor at National University of Singapore (MGP, ЦЭМИ, CEMI).

1998 P. Dingoyan, MdC, Paris 6 (CEMI).

1999 Stéphane Rigat, MdC, Marseille (MGP, ЦЭМИ, CEMI).

1999 F. Sarkis, MdC, Lille (ЦЭМИ, CEMI).

2000 Bruno Fabre, Post-Doc, Princeton (MGP, ЦЭМИ, CEMI).

2004 Luc Pirio, CR CNRS, Rennes (MGP, ЦЭМИ, CEMI).

2007 A. Irigoyen, Post-Doc, Barcelona (ЦЭМИ, CEMI).

? Mehdi Benchoufi (ЦЭМИ; listed there as unfinished.)

Moscow, 1966

Both Gennadi and I gave short talks at the International Congress of Mathematicians in Moscow in August 1966. His talk had the title

Отсутствие изоморфизма между пространствами гладких функций на отрезке и на квадрате.

(Absence of an isomorphism between spaces of smooth functions on an interval and on a square.)

He proves that the spaces $C^{(s)}(I)$ and $C^{(p)}(I^n)$ are never isomorphic when $n \geqslant 2$, $p \geqslant 0$ and $s \geqslant 1$. Here I is an interval; I^n the Cartesian product of n copies of I, i.e., an n-dimensional cube. (For $s = p = 0$ it is well known that there exists an isomorphism.)

I do not remember listening to this talk, and I think he was not listening to my talk.

Lev Isaakovič Ronkin (1931–1998) I met and talked with there for the first time. At a lecture I saw Stefan Bergman, who since 1952 had been at Stanford.

Moscow, 1983

I was in Moscow in 1983, thanks to the exchange program between the Soviet Academy of Sciences and the Royal Swedish Academy of Sciences. I visited three institutions in Moscow, and applied also to visit the one in Kharkov where Ronkin was. The last-mentioned proposed visit was not granted.

I arrived on October 04 and visited Gena at CEMI the next day. We had lunch together there and then went to MGU, where Gena gave a talk, accompanied by many comments and a lot of laughter.

On October 06, I visited CEMI again and talked also with Vladimir Lvovič Levin, Владимир Львович Левин (1938–2012).

In the evening of October 08 I was invited by Gena to his home. His wife, Natasha Novikova, Наташа Новикова, their son, Roman Novikov, Роман Новиков, and Pëtr Polyakov, were also there. Pëtr presented his and Gena's results on extending analytic functions from an analytic subset of a polydisk to the whole polydisk. The main point was a discussion of which kind of transversality should be imposed at the boundary.

Natasha, a numerical analyst, was then at an institute making forecasts for earthquakes.

Roman, soon to be 19, studied in the third year at MGU, more precisely at the Chair of Geometry, кафедра геометрии, headed by Sergeĭ Petrovič Novikov, Сергей Петрович Новиков.

Natasha offered me three kinds of berries: калина 'guelder rose', in Swedish 'olvon', *Viburnum opulus*; малина 'raspberry', in Swedish 'hallon', *Rubus idaeus*; and a berry new to me at the time, Облепиха крушиновидная 'common sea-buckthorn', in Swedish 'havtorn', *Hippophaë rhamnoides*. The latter is a real delicacy which I later found in Finland—called *tyrni* in Finnish. It exists also in Sweden, but less often than in Finland.

On October 12 I was again at CEMI and listened to Gena, Pëtr and others. Gena talked about q-convex sets. Lunch (обед) with Gena, and then to the Gončar–Šabat Seminar at MGU.

Just after my return to the hotel Mikael phoned me and we went to have evening meal (ужин) at Slavyanskiĭ bazar together with his wife Galina and several other persons.

Mikael, at the time with the original family name Pettersson, had studied at MGU during the whole academic year 1981/82, supported by a scholarship from the Swedish Institute. He had married Galina Lepjosjkina, Галина Лепёшкина, in Moscow on 1982 April 06. After that she had the name Galina Pettersson; in December 1984 both of them changed to the new name Passare. Mikael returned quite often to Moscow.

Again on October 14 I was at CEMI, as was Mikael. Gena talked about the relation between q-concave domains and the extension of harmonic functions defined in the real domain into the complex domain. His philosophy was that all partial differential equations in theoretical physics can—or should—be reduced to the Cauchy–Riemann equations together with some algebraic relations.

On October 16 Gena and I visited Vasiliĭ Sergeevič Vladimirov, Василий Сергеевич Владимиров (1923–2012) at the Steklov Institute.

On October 19 I talked at the Vituškin–Gončar–Šabat seminar at MGU. After that Pëtr and I went to listen to Viktor Palamodov, Виктор Паламодов, who talked about Bernstein polynomials. His seminars started at 17:20 and took place in Room 20:17, numbers which reflect the symmetry between time and space, he asserted.

On October 22 I was again invited to Gena's home with Pëtr. In general I talked English with the two, although I knew some Russian since I started to learn the language at the age of thirteen and continued later at Stockholm University College. Pëtr's English was better than Gena's, and it happend a few times that Pëtr had to translate into Russian something I had said.

From all the meetings with Gena and others I have notes.

I gave a talk at MGU (on the definition of the complex Monge–Ampère operator) and one at the Steklov Institute (on the growth of plurisubharmonic functions in infinite-dimensional spaces).

Return to Sweden on October 27.

Six photos taken in 1983; prints made in 2016 from transparencies:

1. 1983 October 08: Natasha Novikova.
2. 1983 October 12: Pëtr Polyakov, Gennadi Henkin.
3. 1983 October 14: Gennadi Henkin, Mikael Pettersson.

Invitation to Sweden

In 1984 I planned to invite Gennadi Henkin to Sweden. After careful preparations in cooperation with the Royal Swedish Academy of Sciences and consultations with Swedish researchers, an official letter was sent on 1985 February 18 to the Director of CEMI, Academician Nikolaĭ Prokof′evič Fedorenko, Николай Прокофьевич Федоренко (1917–2006). The inviting institutions were Uppsala University, Institut Mittag-Leffler, the Swedish Mathematical Society, Umeå University, Göteborg University, Linköping University, and Lund University. The visit was to last four weeks in September and October of 1985.

In an earlier letter, dated 1985 January 23 and delivered in person by Håkan Hedenmalm, Gena had thanked me for my efforts and had given me some advice intended to increase the chances of approval.

The Royal Swedish Academy of Sciences sent the invitation with an official recommendation to the USSR Academy of Sciences in a letter of 1985 February 25. Copies were sent to the Swedish Embassy in Moscow and the Soviet Embassy in Stockholm.

In a letter of 1985 June 04 Gena informed me that a visit of one week, September 25 – October 02, had been included in the academy's program. The choice of dates was motivated by the fact that the Swedish Math Society planned a meeting in Göteborg on September 27–28.

Then in a letter dated 1985 July 31, mailed on August 21, and received on August 28, he wrote that the visit had been cancelled:

> The main reason is a big reorganization of our Institute. In particular we have now new director — член-кореспондент АНСССР — Валерий Леонович Макаров [Corresponding Member of the Soviet Academy of Sciences, Valerij Leonovič Makarov]. I dream to have opportunity to visit Sweden in future (may be in 1986?).

I regretted the decision in a letter of August 28, and mentioned that Institut Mittag-Leffler planned to devote the whole academic year 1987/88 to several complex variables.

In a later letter, of 1985 September 12, I mentioned that Mikael planned to go to Moscow on September 20 and that I hoped for Gena's advice concerning themes and invitees for 1987/88.

Institut Mittag-Leffler, 1987/88

Mikael met Gena in Moscow on 1985 September 27 and discussed the Mittag-Leffler year 1987/88, to be organized by John Erik Fornaess and me. Gena put together two long lists of mathematicians he would like to see at the institute: One with 26 names of mathematicians in the Soviet Union (underlining once names of important scientists; twice those of members of the Academy of Sciences), and one with 33 names of mathematicians from other places. Gena himself was to be invited for one or two months.

A year later, on 1986 October 26, he wrote to me that he would be "extremely happy" to visit Institut Mittag-Leffler for one or two months. To improve the chances of approval, he proposed that the invitation be sent to the new president of the Soviet Academy of Sciences, Gurij Ivanovič Marčuk, академик Гурий Иванович Марчук (1925–2013), a mathematician. I sent such a letter, signed by John Erik and me, to Marčuk on 1986 November 12, with copies to the Soviet Ambassador to Sweden, Boris Pankin, Борис Дмитриевич Панкин; the Swedish Ambassador to the Soviet Union, Anders Thunborg; the President of the Royal Swedish Academy of Sciences, Sven Johansson; the Director of CEMI, Academician Valerij Leonovič Makarov; and of course to G. M. Henkin.

Gennadi did not come to the Mittag-Leffler year.

Moscow, 1989

I was in Moscow, Ufa and Tashkent in 1989, again thanks to the exchange program between the Soviet Academy of Sciences and the Royal Swedish Academy of Sciences. My itinieray was:
October 16: Uppsala – Moscow;
October 25: Moscow – Ufa;

October 31: Ufa – Tashkent;
November 06: Tashkent – Moscow;
November 08: Moscow – Uppsala.
I gave a total of twelve talks in the Soviet Union.

On October 17, Gena walked with me to the home of his mother, where we had an evening meal. Gena told me he had plans to go to the US in 1990, and Natasha planned to go to Canada for three months, starting later in 1989.

On October 20 Gena gave a wonderful lecture on the Radon transformation (injectivity, characterization of the range, inversion); on the Fenchel transform of plurisubharmonic functions; on Padé approximation.

In the evening of October 08 I went to Gena, where there were also several other guests, among them Paul Montpetit Gauthier and his wife Sandralee "Sandy" Gauthier with three of their children: Georges, Cathérine and Caroline.

Three photos; prints made in 1989 from negative color film:

4. 1989 October 17: In the home of Gena's mother: Natasha Novikova, Roman Novikov, Gennadi Henkin, Gennadi's mother;
5. 1989 October 17: Christer Kiselman, Roman Novikov, Gennadi Henkin;
6. 1989 October 18: At a seminar in MGU: Gennadi Henkin, Andreĭ Aleksandrovič Gončar, Андрей Александрович Гончар (1931–2012).

Paris, 1992 and 2005

After Gena's move to Paris, I met him several times at various conferences, in particular at the *Colloque P. Dolbeault* in Paris 1992 June 23–26.

In 2005 we were both invited to give talks at the conference in Honor of Henri Skoda, 2005 September 12–16. Gena talked French now, but not with ease.

Trosa, 1997; Saltsjöbaden, 1999; Uppsala, 2006

When Peter Ebenfelt and Mikael Passare organized the first Nordan Conference in 1997 in Trosa, it was only natural that Gena should be invited. His talk on 1997 March 16 had the title *On boundaries of complex analytic varieties.*

Then in 1999, at the Third Nordan Conference held in Saltsjöbaden and organized by Björn Ivarsson, Burglind Juhl-Jöricke, and Maciej Klimek to celebrate my sixtieth birthday, Gena was invited again and talked on *The $\bar\partial$ equation on singular varieties and projective embeddings of pseudoconcave surfaces.*

In 2006, Gena was invited to give a talk at the Kiselmanfest in Uppsala, May 15–18. His talk on May 16 had the title *Electrical tomography of two-dimensional bordered manifolds and complex analysis.*

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The author is a guest professor at Uppsala University, Department of Information Technology.
Paper address: P. O. Box 337, SE-751 05 Uppsala.
Amber addresses: `kiselman@it.uu.se`, `christer@kiselman.eu`
URL: `www.cb.uu.se/~kiselman`