# Uniqueness in the small – some personal remarks on Olga A. Ladyzhenskaya

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"Uniqueness in the small" entitles Section 2 of Chapter 4 of the famous monograph "Linear and Quasilinear Elliptic Equations" co-authored by Olga A. Ladyzhenskaya and brought me into contact with a small aspect of the outstanding scientific work of this brilliant mathematician. It was the year 1980 and my teacher Klaus Steffen pushed me to write my master thesis by investigating to what extend results for elliptic equations could be adjusted to certain classes of elliptic systems. He suggested to study the "Book" remarking that the Russian Ladies provide a complete analysis of the scalar case. To shorten the description of my first steps doing some mathematical research let me just say that I was lucky and could transfer the uniqueness in the small result from p.257 of the "Book" to the case of systems just following the same ideas and adding more and more restrictions, when things became too complicated.

Some years later another "Book" attracted my attention, namely Professor Ladyzhenskaya's monograph "The Mathematical Theory of Viscous Incompressible Flows", which after more than 50 years still can be seen as one of the basic references in the field of incompressible flows. However, the existence of the Iron Curtain separating not only the mathematical world prevented a direct scientific exchange and made travelling to the Soviet Union an unpleasant and complicated procedure. Thus I knew Professor Ladyzhenskaya only from some official pictures showing the staff of Steklov Institute in St. Petersburg (Leningrad) and through narrations of senior colleagues, who had the rare opportunity to meet her on some conference.

After the fall of the Iron Curtain I started an intensive collaboration with Gregory Seregin from St. Petersburg, who invited me to join a conference held at Steklov Institute dealing with mathematical questions from fluid mechanics and headed by Professor Olga A. Ladyzhenskaya. During the opening ceremony I was introduced to her – a lady dressed in black with an aristocratic touch and surrounded by a group of present and former students reminding me of the entourage of a sovereign. But appearances are deceptive: after a formal introduction and some words of welcome she started a warm and private conversation showing her cultured and charming personality.

In contrast to this the mathematical style of Olga Ladyzhenskaya was uncompromising. During my overview lecture on generalized Newtonian fluids I was suddenly interrupted by her statement "I do not understand your argument" followed by the request "Please give a proof", which brought me into great difficulties and completely destroyed the time schedule of the first day of the conference. However, I learned to use common phrases as "evidently we have"

or "it trivially holds" in a more careful way, being prepared to present also "technical details".

During my stay in 1995 it was still a difficult time for scientists in Russia, which means that their salaries were very low compared with the expenses necessary for daily life, and I learned that even Ladyzhenskaya suffered from the bad economic circumstances. Being one of the most prominent Russian mathematicians she had a lot of offers for long-term visits in Europe or the United States with appropriate financial support, however, she decided to stay in St. Petersburg taking care of the future of Steklov Institute.

Together we successfully applied to several INTAS grants providing a chance for young scientists from the former Soviet Union for a research visit at a European university under acceptable financial conditions. Now, after more than twenty years, it is time for me to admit that my part in this business was rather small: I just signed the documents prepared by Professor Ladyzhenskaya and forwarded them to Brussels. During the preparation of the research proposals for INTAS Olga Ladyzhenskaya showed an enormous foresight by creating a strong interaction between the various topics to be investigated over the years and at the same time she decided very carefully including familiar aspects, who should be supported, which was a much more difficult task in comparison to all other obligations. Let me just say that here Olga Ladyzhenskaya showed a great character.

In the year 2000 we met for the last time. She visited Saarbrücken University, but not only for mathematical reasons. We had various conversations on German history and arts and she impressed me by her deep knowledge on the historical background. One major concern of Olga Ladyzhenskaya was to create a strong connection between Germany and Russia and at least in my case she was successful: starting with her activities and based on her permanent engagement I found a lot of friends at Steklov Institute.

To finish let me say that Olga Ladyzenskaya was a unique character being exceptional in her deep and fundamental contributions to the modern theory of Partial Differential Equations including the foundations of the mathematical theory of hydrodynamics. But mathematical excellence are rather poor words describing in no way the beautiful personality of Professor Olga Ladyzhenskaya.