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Mathematics, Peace, and the Cold War: Scientific Diplomacy and Richard Courant's Scientific Identity

ABSTRACT

This paper seeks to combine studies of émigré scientists, Cold War American science, and cultural histories of mathematical communities by analyzing Richard Courant's participation in the National Academy of Sciences interacademy exchange program with the Soviet Union in the 1960s. Following his dismissal by the Nazi government from his post as Director of the Göttingen Mathematics Institute in 1933, Courant spent a year at the University of Cambridge, and then immigrated to the United States where he developed the Courant Institute of Mathematical Sciences at New York University. Courant's participation with the National Academy of Sciences interacademy exchange program at the end of his career highlights his ideologies about the mathematics discipline, the international mathematics community, and the political role mathematicians could play in contributing to international peace through scientific diplomacy. Courant's Cold War scientific identity emerges from his activities as an émigré mathematician, institution builder, and international "ambassador."

KEY WORDS: Richard Courant, Courant Institute of Mathematical Sciences, New York University, scientific identity, cold war, émigré scientists, scientific diplomacy

INTRODUCTION

In the midst of the Cold War, the mathematician Richard Courant (1888–1972) found himself writing to the President of the USSR Academy of Sciences. His

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The following abbreviations are used: AEC, Atomic Energy Commission; AMS, American Mathematical Society; CC, Courant Collection, New York University Archives, New York, NY; IMS, (Courant) Institute of Mathematical Sciences, New York University; NAS, National Academy of Sciences; NRC, National Research Council; NYU, New York University.

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emphasis on the importance of the international mathematics community—and its potential to contribute to international peace—was strikingly clear. In his letter to Mstislav Keldysh in September 1963, Courant wrote, "We scientists can perhaps make a real contribution to the paramount task of achieving a peaceful world by promoting scientific cooperation and scientific as well as human understanding in the spirit which dominated our recent visit in Novosibirsk."[1] What was this contribution Courant spoke of? How and why did Courant cross the Iron Curtain to visit the scientific center of Akademgorodok outside of Novosibirsk? In seeking the answers to these questions, a complex portrait of Courant's Cold War scientific identity comes into focus.

In August 1963, Courant chaired a National Academy of Sciences (NAS) delegation of nearly two dozen American mathematicians to attend a two-week symposium held in Akademgorodok, the "Academy Town" outside of Novosibirsk, Siberia, USSR, as part of the two nations' interacademy exchange program. This historical moment, in the depths of the Cold War, serves as a productive entry point into Courant's multifaceted involvement in both the NAS's exchange program and the larger military-industrial-academic complex. Courant's formal activities with the NAS included acting as delegate to the USSR on three occasions throughout the 1960s, as well as hosting Soviet visitors at his home institution of New York University (NYU). Upon his return from each official NAS-sanctioned visit to the Soviet Union, Courant fulfilled the NAS expectation of circulating a report on the status of scientific life in the areas he visited, his opinions on the value of such exchanges, and recommendations for future exchange programs. The Atomic Energy Commission (AEC) also demanded a report of all scientific contacts made during his trips, as Courant held a high-level security clearance. Courant, however, was far from an unbiased participant or observer. Rather, he had been deeply entrenched in the international mathematics community since his days as a student in Germany. Additionally, Courant's participation with the interacademy exchange program followed nearly three decades of institution-building in mathematics at NYU, during which time he and his Institute were involved in an array of military-, industrial-, and private foundation-sponsored activities.

In addition to his work in mathematical physics, which was in short supply in the United States prior to his arrival to New York in 1934, Courant was

1. Courant to Mstislav Keldysh, 8 Sep 1963, CC, Box 90, Folder 15; also in NAS Archive, ADM: IR: East-West Exchange: Symposium on Partial Differential Equations.

perhaps best known for his prolific textbook writing and administrative faculties. Throughout his long career, Courant served as director of the Göttingen Mathematics Institute, developed NYU's Institute of Mathematical Sciences, and published a number of highly regarded textbooks, which have been translated into many languages.[2] His administrative prowess extended far beyond establishing grants within the American military-industrial-academic complex, however, and an analysis of his Cold War activities sheds tremendous insight on his vision for the discipline of mathematics both in the United States and abroad, and the social role of the mathematician as a scientific diplomat. As he shaped a novel form of mathematical diplomacy within the Cold War, Courant's work with the interacademy exchange program helped define the role of a scientific diplomat.

This paper will document Courant's involvement with the NAS's interacademy exchange program, with a particular focus on the 1963 Joint Symposium on Partial Differential Equations held in Akademgorodok, Siberia. In so doing, this essay will examine Courant's activities for the NAS, particularly his direct engagement with Soviet scientists, his work chairing the committee that selected American mathematicians to participate in the 1963 symposium, and his reports on all such exchange visits. These official NAS activities will be put in relief with his other Cold War activities, including serving as a scientific advisor to NYU's research and training mathematics institute, the Institute of Mathematical Sciences (later renamed the Courant Institute of Mathematical Sciences). This paper also seeks to historicize Courant's involvement with the NAS as part of his continued participation in the elite mathematics community, through which he had established a wide range of international contacts—including colleagues from Russia—dating back to the 1920s.

Courant's Cold War scientific activities were rooted in his experiences as an émigré scientist.[3] Courant's career at the University of Göttingen, his

2. See, for example: Richard Courant and David Hilbert, *Methoden der mathematischen Physik*, (Berlin: Springer, 1924); and Richard Courant, *Vorlesungen Über Differential- und Integralrechnung* (Berlin: Springer, 1927).

3. Important work on émigré scholars includes: Mitchell G. Ash and Alfons Söllner, eds., *Forced Migration and Scientific Change: Émigré German-Speaking Scientists and Scholars after 1933* (Cambridge: Cambridge University Press, 2002). In "Introduction: Forced Migration and Scientific Change after 1933," Ash and Söllner suggest that émigré scholarship has appropriately experienced a "turn in recent years from assessing the products or contributions of the émigrés to the processes of intellectual and cultural change that produced them," 3. They advocate studying these acculturation processes by paying attention to languages, scientific workplaces, cultural values, and collaborations between émigrés and "non-émigrés," 11–16.

self-identity as a member of an elite well-educated international community of mathematicians, and his identity as a German-Jewish scholar who had been dismissed from the German university system shaped his scientific persona.[4] By the time Courant came to represent the NAS in 1960 as an official delegate to the Soviet Union, he was 72 years old and had been in the United States for nearly thirty years. Thus, his role with the NAS, which continued through the 1960s, drew extensively on his activities as a distinguished statesman, representing an older generation of émigré scientists who had already experienced decades of acculturation, as well as two world wars. Within this context, this paper will analyze how Courant came to be involved in the NAS interacademy exchange program and how he navigated the American and Soviet academies, universities, and government institutions. I argue that Courant's self-identity as an émigré scholar belonging to an elite international community of well-educated mathematicians profoundly affected his participation in the NAS program, as well as his ideologies about how mathematics could function in international scientific diplomacy.

Courant's self-identity and scientific persona help reveal new facets of the well-established literature on scientific identity and diplomacy in the Cold War.[5] The multifariousness of the military-industrial-academic complex had very different effects on individuals, depending on where they were in their career, how they imagined the role of collaboration, and, as Jessica Wang discusses of Merle Tuve, their approach to humanistic emotions and ideologies of "pure science."[6] International scientific collaborations have also been

4. For more on this topic, see Birgit Bergmann, Moritz Epple, and Ruti Ungar, eds., *Transcending Tradition: Jewish Mathematicians in German-Speaking Academic Culture* (Heidelberg: Springer-Verlag, 2012).

5. See, for example, "Special Issue: Science in the Cold War," *Social Studies of Science* 31, no. 2 (Apr 2001): 163–310. Also see Stuart Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (New York: Columbia University Press, 1993); and Chandra Mukerji, *A Fragile Power: Scientists and the State* (Princeton, NJ: Princeton University Press, 1989).

6. Jessica Wang, "Physics, Emotion, and the Scientific Self: Merle Tuve's Cold War," *Historical Studies in the Natural Sciences* 42, no. 5 (Nov 2012): 341–88. For more on scientific identities and personas, from the scientific-self to loyalties in international scientific collaboration, see, for example: David Kaiser, "The Postwar Suburbanization of American Physics," *American Quarterly* 56 (2004): 851–88; Rebecca M. Herzig, *Suffering for Science: Reason and Sacrifice in Modern America* (New Brunswick, NJ: Rutgers University Press, 2005); Steven Shapin, *The Scientific Life: A Moral History of a Late Modern Vocation* (Chicago: University of Chicago Press, 2008); and Hunter Heyck and David Kaiser, "Introduction," *Focus: New Perspectives on Science and the Cold War*, *Isis* 101, no. 2 (June 2010): 362–66.

candidates for nationalistic agendas; as John Krige explained it in the context of Atoms for Peace, "one could be both a good scientist and a good patriot."[7] In the case of Courant's participation in the NAS program, I demonstrate that Courant considered himself to be a "good scientist," a "good patriot," and perhaps, a good global citizen. His willingness, nay eagerness, to participate in and facilitate international exchanges reflects not only his self-identity as a mathematician serving national and international interests, but also his self-identity as a member of a community of international mathematicians who were bound not only by their intellectual field but also by their shared educational traditions. These educational traditions, in Courant's eyes, included dynamic seminars, a vibrant intellectual community, and collaboration between professors and advanced graduate students. Like Michael Polanyi, as described by Mary Jo Nye, Courant adhered to the social, communicative conception of science in which he had been indoctrinated as a student and young scholar.[8] His belief in this community was further instilled as an émigré scholar. Following his dismissal from the German university system in April 1933, Courant was able to find academic placements in the United Kingdom and later in the United States, only as a result of his professional network in mathematics and private foundations.[9]

Courant's involvement with the NAS interacademy exchange program serves as perhaps the pinnacle of his Cold War activities. In his dealings with the NAS, as well as the AEC, the Soviet Academy of Sciences, and his colleagues in the mathematics community, Courant's vision of mathematics framed its diplomatic potential in terms of the way in which the field produced knowledge. He was passionate that mathematics should be considered as a broad discipline, including both pure and applied tendencies, and having close cooperation with the natural sciences. He consistently referenced the value of combining advanced teaching and research, and he admired the Soviet mathematics community for its success in this regard, an ideal he believed was rooted in the German model of his own training. By promoting this particular view of mathematics, Courant was able to successfully establish relationships

7. John Krige, "Atoms for Peace, Scientific Internationalism, and Scientific Intelligence," *Osiris* 21, no. 1, (2006): 161–81, on 180.

8. Mary Jo Nye, *Michael Polanyi and His Generation: Origins of the Social Construction of Science* (Chicago: University of Chicago Press, 2011).

9. For more on the international mathematics community following the dismissals, see Reinhard Siegmund-Schultze, *Mathematicians Fleeing from Nazi Germany: Individual Fates and Global Impact* (Princeton, NJ: Princeton University Press, 2009).

with an array of government, military, and industrial organizations, the trust of the U.S. military, and an invitation to visit the Soviet Union, even in times of utter political strain.

By contextualizing Courant's NAS activities with both his long-standing dedication to the international community of mathematicians, as well as his entanglements with the military-industrial-academic complex, a more nuanced understanding of the significance of these activities to the broader history of Cold War science emerges. We are left with a complicated portrait of Courant's self-constructed scientific identity, as he partook in endeavors that served both national and international interests. While participating in the NAS exchange program as an "ambassador," Courant was also serving as a reliable informant on the status of Soviet science to his American peers in the government and military.[10] Such ostensibly opposing activities, however, were far from unusual. By exploring how Courant navigated this terrain, this essay offers a nuanced view of how these seeming contradictions of the Cold War era were resolved by an individual with a long-standing commitment to the diplomatic role of mathematicians. This paper broadens our understanding of diplomacy as a critical dimension of Cold War science by showing how one central figure framed his diplomatic endeavors as a significant part of his scientific identity. By the same token, it also demonstrates how the interactions under the official umbrella of scientific diplomacy were reconfigured by individuals.

"CEMENTING SCIENTIFIC RELATIONS"

In July 1959, the National Academy of Sciences–National Research Council (NAS-NRC) announced that it had signed an interacademy exchange agreement with the Soviet Academy of Sciences.[11] The NAS described the agreement as part of the broader cultural, technical, and educational exchange

10. As will be discussed later in this paper, Courant's 1963 report, written for the NAS, was distributed among NAS, Department of State, National Science Foundation, Atomic Energy Commission, Department of Commerce, Department of Defense, National Aeronautics and Space Administration, Office of Naval Research, American Council of Learned Societies, and Inter-University Committee on Travel Grants officials. See ref. 88, below. A request under the Freedom of Information Act was submitted by the author to the Central Intelligence Agency on 30 Aug 2013. The request is being processed.

11. "News from National Academy of Sciences National Research Council," 21 Jul 1959, CC, Box 32, Folder 10.

program between the two nations established under the Lacy-Zarubin agreement, signed the previous year, which was "hailed by the U.S. State Department as a 'significant first step in the improvement of mutual understanding.'"[12] NAS President Detlev Bronk described the interacademy agreement to the organization's members as one created, "at the request of the Department of State," to allow for scientific exchanges between the countries.[13] Bronk added that the agreement was "not intended to define or limit the total scientific exchanges." Indeed, individual scientists from each country had visited institutions in the other's countries for years; Bronk himself had visited the Soviet Union following the Second World War on the invitation of the Soviet Academy of Sciences. The interacademy exchange agreement, however, provided formal exchange procedures, called for equal reciprocity, and detailed the areas of research to be prioritized.

This original interacademy agreement, which was renewed with some alterations biannually over the coming decade, allowed for exchange visits by individual research scientists for up to one year, as well as joint symposia. The individual visits could be conducted under one of three categories: twenty scientists from each country would deliver lectures and participate in research and seminars, for up to one month; about eighteen scientists from each country would spend about one month in a laboratory within a selection of designated scientific specialties; and six scientists from each country would spend more substantial amounts of time to participate in a specialized program of research. The agreement outlined that each Academy would pay the salaries and international travel expenses for its own scientists, while the receiving side would pay for housing, medical aid, and local travel for its visitors.

A discussion of Courant's efforts to employ mathematics as an object of cultural exchange to foster peaceful international relations through the interacademy exchange program must be situated within a broader context of the contemporaneous ideology of international scientific cooperation. Other prominent scientists shared Courant's outlook, such as the engineer, physicist, and proponent of the 1957–58 International Geophysical Year, Lloyd Berkner, who argued that international scientific cooperation was as "an effective instrument of peace."[14] This sentiment was also reiterated by the Russian émigré Eugene

12. Ibid.

13. Detlev Bronk to members of the National Academy of Sciences, 22 Jul 1959, CC, Box 32, Folder 10.

14. See Clark A. Miller, "'An Effective Instrument of Peace': Scientific Cooperation as an Instrument of U.S. Foreign Policy, 1938–1950," *Osiris* 21, no. 1 (2006): 133–60; and Allan A.

Rabinowitch, who co-founded the *Bulletin of the Atomic Scientists* with Hyman Goldsmith.[15] Joseph Manzione describes Rabinowitch's ideology of "scientific internationalism" as holding "that scientific knowledge was universally valuable, that the methods and practice of science must remain unaffected by culture or politics, that unrestricted scientific exchange among professionals of all nations or peoples was critical to the progress of science and human civilization, and that science itself was a kind of *lingua franca* that promoted a cosmopolitan perspective, unified goals, and an order based on merit that crossed international boundaries."[16] Manzione argues that these tenants of "scientific internationalism" were espoused by a number of scientists belonging to the "Los Alamos generation," such as Niels Bohr.[17]

Studies of scientists employing international cooperation as a form of diplomacy propose that such efforts maintained a constellation of means and ends. On one level, scientists demonstrated a direct engagement with politics and policy. In his study of Cold War scientists serving professional roles of import in foreign policy as advisors and intelligence agents, Richard E. Doel identifies that a common argument among American scientists for contact with their Soviet peers was the view "that science was a wedge capable of strengthening advocates of democracy behind the Iron Curtain."[18] In such cases, programs were intended to advocate democratic ideals to citizens of communist countries. Scientists demonstrating not only technical but also political expertise by establishing international cooperation is further illuminated in Clark A. Miller's work on the Word Meteorological Organization. Miller identifies the juxtaposition of an "ideological commitment to the political neutrality of science" with "the challenges that arose to their efforts to realize that neutrality in pragmatic, institutional terms" among meteorologists and

Needell, *Science, Cold War and the American State: Lloyd V. Berkner and the Balance of Professional Ideals* (Amsterdam: Harwood Academic Publishers, 2000).

15. Patrick David Slaney, "Eugene Rabinowitch, the *Bulletin of the Atomic Scientists*, and the Nature of Scientific Internationalism in the Early Cold War," *Historical Studies in the Natural Sciences* 42, no. 2 (Apr 2012): 114–42.

16. Joseph Manzione, "'Amusing and Amazing and Practical and Military': The Legacy of Scientific Internationalism and in American Foreign Policy, 1945–1963," *Diplomatic History* 24, no. 1 (Winter 2000): 21–55.

17. Ibid.

18. Ronald E. Doel, "Scientists as Policymakers, Advisors, and Intelligence Agents: Linking Contemporary Diplomatic History with the History of Contemporary Science," in *The Historiography of Contemporary Science and Technology*, ed. Thomas Söderqvist (Amsterdam: Harwood Academic Publishers, 1997), 215–44.

policymakers.[19] To establish its international network, Miller argues, the meteorology community had to successfully engage with a complex political arena.

On another level, endeavors in international scientific cooperation could present inherently contradictory challenges, particularly when scientists were involved in information gathering or surveillance of scientific activities in other countries. John Krige's discussion of the Atoms for Peace initiative demonstrates how it simultaneously served both knowledge sharing and surveillance functions. Such tensions between openness and collaboration on the one hand and secrecy and surveillance on the other are echoed in the interacademy exchange program.[20]

These ideologies and tensions in the social role of scientists during the Cold War were not lost on Courant. While explicitly referencing the contribution the international mathematics community could make toward international peace, Courant and his contemporaries were also aware of their roles as technical experts, trusted and often funded by the government, who were obliged to report on the status of Soviet science. In Courant's endeavors to visit and host his Soviet colleagues under the auspices of the interacademy exchange program, we see a striking portrait of how a single mathematician espoused both nationalistic goals and international diplomatic efforts while maintaining a multifaceted scientific identity.

It was certainly more than happenstance that Courant was among the first American scientists to represent the NAS in the Soviet Union under the auspices of this exchange agreement. First of all, the Soviet Union had a strong tradition in the mathematical sciences, thus an exchange between mathematicians was, perhaps, a natural field to select. Second, Courant was a distinguished statesman by the time the 1958 Lacy-Zarubin agreement was signed, and viewed as a recognizable player in the international mathematics community as well as a trusted American citizen. His name, textbooks, and institutional leadership were widely known in both American and Soviet mathematics circles. And finally, Courant had already established personal

19. Clark A. Miller, "Scientific Internationalism in American Foreign Policy: The Case of Meteorology, 1947–1958," in *Changing the Atmosphere: Expert Knowledge and Environmental Governance*, ed. Clark A. Miller and Paul N. Edwards (Cambridge, MA: MIT Press, 2001), 167–217. Also see Miller and Edwards, "Introduction: The Globalization of Climate Science and Climate Politics," in idem., 1–30, on 23.

20. John Krige, "Atoms for Peace, Scientific Internationalism, and Scientific Intelligence," *Osiris* 21, no. 1 (2006): 161–81.

relationships with Soviet mathematicians in elite positions within the Soviet academy system.

Having received his mathematics doctorate from the University of Göttingen under the tutelage of David Hilbert, Courant was very much a part of the elite German mathematics and mathematical physics community.[21] David E. Rowe's studies of the Göttingen mathematical community in particular, which Courant very much idolized and tried to emulate in the United States, describes the nature of the German academic system and the influential leadership of Hilbert and Felix Klein.[22] Following Klein's retirement in 1920, Courant rose to the position of director of the mathematics institute in Göttingen. Over the following decade, Courant further cemented his status in the international mathematics community by maintaining old—and developing new—lifelong bonds with the likes of Niels and Harald Bohr, Hermann Weyl, and the esteemed Russian mathematicians Pavel Alexandrov and Andrey Kolmogorov. Networking with the American Rockefeller Foundation and the Prussian Ministry of Culture, Courant succeeded in securing funds for the construction of a building for the Göttingen Mathematics Institute. In addition to his own publications (perhaps most importantly the Courant-Hilbert

21. For more on Courant's career in Göttingen, see: David E. Rowe, "Transforming Tradition: Richard Courant in Göttingen," *Mathematical Intelligencer* 37, no. 1 (2015): 20–29; Constance Reid, *Courant in Göttingen and New York* (New York: Springer-Verlag, 1996 [1976]); Otto Neugebauer, "Reminiscences on the Göttingen Mathematical Institute on the Occasion of R. Courant's 75th Birthday," Institute for Advanced Study, Princeton, Otto Neugebauer Papers, Box 14, Publications Vol. 11. For more on mathematical communities, see: Moritz Epple, "Kuturen der Forschung: Mathematik und Modernität am Beginn des 20. Jahrhunderts," in *Wissenskulturen: über die Erzeugung und Weitergabe von Wissen*, eds. Johannes Fried and Michael Stolleis (Frankfurt/Main: Campus Verlag, 2009), 125–58; David E. Rowe, "Disciplinary Cultures of Mathematical Productivity in Germany: 1855–1933," in *Publikationsstrategien einer Dizsiplin. Mathematik in Kaiserreich und Weimarer Republik*, eds. Volker R. Remmert and Ute Schneider (Wiesbaden: Harrassowitz Verlag, 2008), 9–51; and David E. Rowe, "Mathematical Schools, Communities, and Networks," in *Modern Physical and Mathematical Sciences*, ed. Mary Jo Nye, vol. 5 of *The Cambridge History of Science* (Cambridge: Cambridge University Press, 2003), 113–32. For more on the Göttingen mathematical community, see Norbert Schappacher, "Das Mathematische Institut der Universität Göttingen 1929–1950," in ed. Heinrich Becker, Hans-Joachim Dahms, and Cornelia Wegeler, *Die Universität Göttingen unter dem Nationalsozialismus: Das verdrängte Kapitel ihrer 250jährigen Geschichte* (München: K.G. Saur, 1987), 344–73. A revised version can be found online: Norbert Schappacher, "Das Mathematische Institut der Universität Göttingen 1929–1950" (Apr 2000), http://www-irma.u-strasbg.fr/schappa/NSch/Publications_files/GoeNS.pdf (accessed 29 Aug 2016).

22. David E. Rowe, "'Jewish Mathematics' at Göttingen in the Era of Felix Klein," *Isis* 77 (1986): 422–49; and David E. Rowe, "Klein, Hilbert and the Göttingen Mathematical Tradition," *Osiris* 5 (1989): 186–213.

Methoden der Mathematischen Physik), he also was instrumental in the development of the "Yellow Series," a collection of textbooks published by Springer called *Die Grundlehren der mathematischen Wissenschaften*.[23] Until his dismissal from the German university system by the Nazi government in April 1933, Courant was a central operator in this elite community.[24]

Following his dismissal, Courant spent a year at the University of Cambridge and then immigrated to the United States in the fall of 1934.[25] He devoted the remainder of his career to developing a mathematics institute at NYU. Of course, the depression, war, and postwar eras in the United States were strikingly different from his experiences in Germany. Although this essay does not allow for a full study of Courant's activities in the United States, suffice it to say that his acculturation process included moments of both frustration and success. Relevant to his later participation in the NAS exchange program, Courant was able to establish for himself a network of colleagues in academia, the government, industry, and private foundations. Particularly during and after the Second World War, Courant and his colleagues, importantly James J. Stoker and Kurt O. Friedrichs, maintained an array of research contracts.[26] By the late 1950s, NYU's Institute of Mathematical Sciences was operating an AEC supercomputer, while balancing research work for the Office of Naval Research and the National Science Foundation, among other organizations, and graduating an average of fifteen doctoral students a year. Courant himself was recognized by the U.S. Navy with the Navy Distinguished Public Service Award in 1958, the highest honor of its kind for a civilian.[27]

Individual émigrés' postwar interactions with Europe varied widely, from those who never returned to those who returned permanently. Although

23. Courant and Hilbert, *Methoden* (ref. 2).

24. Brittany Anne Shields, "A Mathematical Life: Richard Courant, New York University and Scientific Diplomacy in Twentieth-Century America" (PhD dissertation, University of Pennsylvania, May 2015).

25. Reinhard Siegmund-Schultze, *Mathematiker auf der Flucht vor Hitler. Quellen und Studien zur Emigration einer Wissenschaft* (Braunschweig, Wiesbaden: Vieweg, 1998); Seigmund-Schultze, *Mathematicians Fleeing from Nazi Germany* (ref. 9); and Reinhard Siegmund-Schultze, *Rockefeller and the Internationalization of Mathematics Between the Two World Wars: Documents and Studies for the Social History of Matheamtics in the 20th Century* (Basel, Boston, and Berlin: Birkhäuser, 2001).

26. For more on mathematics during the Second World War, see: Mina Rees, "The Mathematical Sciences and World War II," *The American Mathematical Monthly* 82, no. 8 (Oct 1980): 607–21; and Bernhelm Booß-Bavnbek and Jens Høyrup, eds., *Mathematics and War* (Berlin: Birkhäuser, 2003).

27. "Scientists in the News," *Science*, New Series 128, no. 3318. (1 Aug 1958): 244.

Courant fell into neither extreme, he did return to Germany after the war, as well as to many other parts of Western and Eastern Europe on an annual basis, typically with funding from the U.S. Navy. His motivations for these trips included an interest in re-establishing the international community of mathematicians, rehabilitating the German universities, and personal interests in caring for loved ones still in Germany. He maintained a close relationship with the Bohr brothers and further established himself as a recognizable figure in the international mathematics community.

Among these important contacts were some prominent Russian mathematicians, including Alexandrov, Kolmogorov, and Olga Ladyzhenskaya. During the immediate postwar years and into the 1950s, Courant reestablished old—and developed new—contacts with a number of Soviet mathematicians, expressing his desire to visit the Soviet Union, inviting them to visit the United States, and seeking academic contributions for various publications. Later in life, Courant fondly reminisced about Russian mathematicians spending time in Göttingen during the 1920s, among them Alexandrov and Kolmogorov.[28] Courant reestablished contact with Alexandrov in late 1945, addressing him, "dear friend, after an interruption of so many years," continuing to describe the wartime work of the NYU mathematicians, and giving updates "concerning old friends," such as Otto Neugebauer and Carl Siegel. Courant added, "I very much hope that our personal and scientific contacts can soon be fully resumed and, as a matter of fact, nothing would please me more than visiting you some time." Courant expressed that he and Warren Weaver of the Rockefeller Foundation were very interested in "the whole question of international scientific relations." Courant concluded his correspondence with a request for Alexandrov and Kolmogorov to contribute to a yellow book series with Interscience Publishers.[29] Courant later invited Alexandrov and Kolmogorov to visit NYU as an extension to their planned visit to the Institute for Advanced Study in the fall of 1946 to deliver a series of lectures on the progress of mathematics in the Soviet Union over the previous ten years, suggesting that it "may be very helpful in cementing scientific relations so tragically interrupted during the past war."[30]

28. Richard Courant, "Reminiscences from Hilbert's Göttingen," *The Mathematical Intelligencer* 3, no. 4, (1981): 157. In addition to Alexandrov and Kolmogorov, the group included Pavel Uryson, who tragically died in 1924.

29. Richard Courant to Pavel Alexandrov, 26 Dec 1945, CC, Box 22, Folder 4.

30. Richard Courant to Pavel Alexandrov and A. Komogoroff, 19 Mar 1946, CC, Box 22, Folder 4.

Following the death of Stalin, contacts between U.S. and USSR mathematicians expanded, on both personal and institutional levels.[31] In 1956, Courant invited Olga Ladyzhenskaya to publish in NYU's Institute of Mathematical Sciences' *Communications on Pure and Applied Mathematics* journal, as "we welcome very much any scientific contact with our Russian colleagues for whose individual and collective work in mathematical sciences we have profound admiration."[32] Several years later, Courant extended invitations to Ladyzhenskaya and Ivan Petrovsky to visit the Institute as visiting members.[33] Although the visits did not come to fruition at the time, Courant maintained contact and intellectual dialogue with these peers. Petrovsky, who politely declined his invitation, sent Courant a print of a recent paper, and the *Communications* published several of Ladyzhenskaya's papers.[34]

Institutional changes in the international mathematics community were also taking place, including the formal admission of the USSR to the International Mathematical Union in 1957.[35] The Soviet Committee for Mathematics included Alexandrov, as well as several other mathematicians Courant would later establish contact with, such as Nikolai Bogoliubov, Mikhail Lavrentyev, and Sergei Sobolev. Expanded contact among U.S., Western European, and Soviet mathematicians reached a level of particular significance at the 1958 International Congress of Mathematicians held in Edinburgh. Of the more than 2,000 mathematicians in attendance, thirty-five were Soviet mathematicians.[36]

31. For more on the international mathematics community in mid-twentieth century, see Karen Parshall, "Marshall Stone and the Internationalization of the American Mathematical Research Community," *Bulletin of the American Mathematical Society* 46, no. 3 (July 2009): 459–82.

32. Richard Courant to Olga Ladyzhenskaya, 5 Apr 1956, CC, Box 78, Folder 3. Ladyzhenskaya published in the Communications in 1959 and 1961. The first article was received in January 1959; see O. A. [Ladyzhenskaia], "Solution 'in the large' of the nonstationary boundary value problem for the Navier-Stokes system with two space variables," *Communications on Pure and Applied Mathematics* 12, no. 3 (Aug 1959): 427–33. The second was received in February 1961; see O. A. [Ladyzhenskaia] and N. N. Ural'Tzeva, "On the smoothness of weak solutions of quasilinear equations in several variables and of variational problems," *Communications on Pure and Applied Mathematics* 13, no. 3 (Aug 1961): 481–95.

33. Richard Courant to Olga Ladyzhenskaya, 10 Jul 1958, CC, Box 78, Folder 3; Ivan Petrovsky to Richard Courant, 23 Apr 1958, CC, Box 78, Folder 3.

34. See ref. 20.

35. Olli Lehto, *Mathematics Without Borders: A History of the International Mathematical Union* (New York: Springer Verlag, 1991), 122.

36. Ibid., 142–43.

Courant's participation in the 1958 International Congress of Mathematicians in Scotland allowed for much greater personal contact with Soviet mathematicians, which he fostered following the meeting. Courant wrote to Alexandrov, expressing that he was happy to have seen him in Scotland and "to feel that all these years in between did not matter." Courant also expressed his desire to visit the Soviet Union.[37] The Scotland Congress also provided Courant the opportunity to meet new Soviet colleagues, including Bogoliubov to whom he wrote that he hoped, "these contacts will broadly and intensely develop."[38] Several months later, Courant sent him a "formal invitation" to visit the United States and enclosed photographs from their trip to Scotland, with the promise to also send a personal music recording.[39] Courant shared similar correspondence, and the desire for exchange visits, with Olga A. Oleinik and Arkadii Migdal in Moscow.[40] Courant also maintained an exchange of intellectual work, sending P. I. Nikitin a set of the IMS journal, who then responded by sending two series of the review journal, *Mathematics and Mechanics*. Nikitin wrote, "We salute all measure directed at the strengthening of a close scientific connection with your scholars," commenting on the facilitation of NYU mathematician Lipman Bers.[41]

Also during the 1950s, Courant and his colleague Kurt Friedrichs had corresponded with the NAS about the potential of hosting Soviet mathematicians at the NYU Institute.[42] Courant corresponded directly with the NAS President, Detlev Bronk, who had held the office since 1950, while also maintaining his post as president of the Rockefeller Institute for Medical Research. Courant described his recent trip to the 1958 International Union in Scotland, where he "had opportunities of talking with old friends among the Russian academicians," adding that he seemed to still have "excellent personal contacts with them from old times" and received invitations to visit Russia. Courant

37. Richard Courant to Pavel Alexandroff, 3 Nov 1958, CC, Box 22, Folder 4.

38. Richard Courant to N. N. Bogoliubov, 29 Aug 1958, CC, Box 78, Folder 3.

39. Richard Courant to N. N. Bogoliubov, 17 Oct 1958, CC, Box 78, Folder 3.

40. Courant referred to a music recording that he would send, as well as a photograph of their boat excursion in Scotland. Richard Courant to Olga Oleinik, 22 Oct 1958, CC, Box 78, Folder 3; Migdal to Richard Courant, 12 Dec 1958, CC, Box 78, Folder 3.

41. P. I. Nikitin to Richard Courant, [no date (probably 1958 or 1959)], CC, Box 78, Folder 3. For more on Bers and his participation in Soviet relations, see William Abikoff, "Lipman Bers," *Notices of the AMS* 42, no. 1 (Jan 1995): 8–25.

42. The Executive Officer of the NAS-NRC, S. D. Cornell, notified Courant that Bronk received a telegram from him and Friedrichs regarding their plan to invite Soviet mathematicians. S. D. Cornell to Richard Courant, 6 May 1958, CC, Box 32, Folder 10.

continued that he hoped the NYU mathematics institute could establish contact with corresponding institutes in Moscow, Leningrad, and elsewhere in the Soviet Union. He described how the Institute had been trying to invite some Russian mathematicians, including Alexandrov and Ladyzhenskaya, but they had not received the necessary advisory approval from the U.S. Department of State. Courant specified that Lawrence Mitchell, of the NAS's East-West Contacts Staff, indicated that the Department of State "is very much worried about the question of reciprocity." Referencing Bronk's upcoming trip to Moscow, Courant requested that Bronk discuss "such matters" with his Soviet counterpart.[43]

Thus, by the time the NAS announced its interacademy exchange program with the Soviet Union in July 1959, Courant had built longstanding relationships with a number of Soviet mathematicians and had already exchanged invitations to visit. Following the announcement of the formal agreement, Courant again wrote to Oleinik that he hoped to visit Russia and had begun discussing matters with the NAS. Courant commented that his NYU colleague Bers had plans to visit Moscow computing labs with an exchange delegation. Courant emphasized that he was "very much interested in seeing some real exchange established between New York Institute of Mathematical Sciences and corresponding groups in Russia."[44]

"SCIENTIFIC LIFE" IN THE SOVIET UNION: COURANT'S 1960 NATIONAL ACADEMY OF SCIENCES TRIP

Courant's 1960 NAS trip was his first time visiting the Soviet Union. The timing was contentious, as he arrived in Moscow just weeks after the U-2 spy plane incident. The Soviets had a public display of the U-2 plane's remains in Gorky Park, an exhibition Courant and his junior colleague Peter Lax visited. Despite the potentially sensitive environment, Courant later remarked that the trip had proven useful in promoting a friendly scientific exchange between the two countries. Decades later, Lax made light of the incident by remarking how an engineer describing the workings of the plane was "honored" to meet Courant, from whose textbooks he had learned aerodynamics.[45] Although Lax relayed the anecdote partly in jest, it speaks to

43. Richard Courant to Detlev Bronk, 13 Oct 1958, CC, Box 32, Folder 10.
44. Richard Courant to Olga Oleinik, 14 May 14 1959, CC, Box 78, Folder 3.

Courant's place in the international scientific community even prior to his arrival in the Soviet Union.

Having already established his interest in exchange visits with his Soviet colleagues and being an NAS member himself (since 1955), Courant was a natural fit for the exchange program. Shortly after the interacademy exchange agreement was announced, Courant expressed his interest in visiting the Soviet Union to NAS officials. NAS President Bronk, supportive of Courant's request, wrote to the Soviet Academy on Courant's behalf. Bronk also informed Courant that his travel would be subsidized by the NAS through grants secured from private foundations and government agencies, per the exchange agreement terms.[46]

Courant's biographical sketch for the NAS reflected his distinguished status within the international mathematics and scientific community, detailing such honors as his membership in the NAS, the Royal Danish Academy of Sciences and Letters, and an honorary membership in the Moscow Mathematical Society.[47] For individual exchanges, the NAS would only send distinguished scientists, a policy made clear when Courant requested that his younger colleague, Lax, accompany him. In the end, Lax was able to join Courant on the trip, but only as a tourist and not as an official NAS delegate. Courant's wife Nerina (*née* Runge) Courant also accompanied him on the trip.

In his correspondence with the NAS and his Soviet colleagues, Courant emphasized that his primary reason for wanting to visit the Soviet Union was to gain first-hand observations of the Soviet institutional organization of the mathematics discipline, rather than any specific research program. In writing to Wallace W. Atwood Jr., the Director of the Office of International Relations at the NAS, Courant detailed his intention to visit Moscow, Leningrad, Tiflis, and Novosibirsk as wanting to "receive more authentic impressions of the interaction between mathematics and other sciences, in particular physics and engineering. I have the feeling that this interaction is one of the key points on which a healthy and vigorous development depends, and it may well be that we can learn a lot from Russia where such a tradition seems to be much stronger than it is here."[48] Courant clearly articulated the strengths of the Russian

45. Peter D. Lax, "Richard Courant 1888–1972," *Biographical Memoirs* 82 (Washington, DC: The National Academy Press, 2003), http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/courant-richard.pdf (accessed 29 Aug 2016).

46. Detlev Bronk to Richard Courant, 12 Jan 1960, CC, Box 88, Folder 17.

47. NAS Biography of Richard Courant, 1 Feb 1960, CC, Box 88, Folder 17.

48. Richard Courant to Wallace W. Atwood, Jr., 1 Feb 1960, CC, Box 88, Folder 17.

mathematical tradition, which echoed his own ideology of the mathematics discipline. In writing to the Soviet mathematician Sergei Sobolev, Courant reiterated that his main interest in visiting Novosibirsk was "to obtain some closer impression concerning the interaction of applied mathematics and other sciences" and "to exchange views and experiences about building up scientific life with a tendency to cross boundary lines between different fields."[49] Although his intended visit to Novosibirsk would not come to fruition on this first trip, Courant was able to visit Moscow, Leningrad, and Tiflis.

Courant's rhetoric of building a scientific institution bridging disciplinary boundaries in the mathematical sciences was consistent with his already well-established views on mathematics, as displayed throughout his efforts at NYU and most certainly in his experiences in Göttingen. His Göttingen background was relevant not only because he was placed within an elite academic community, but also because he had cultivated a particular view of mathematics and mathematics education that would reverberate throughout his career, and that he would admire in the Russian system. Courant himself credited Felix Klein and David Hilbert for his own appreciation of mathematics encompassing both pure and applied realms, the importance of mathematics to the natural sciences, and the value of integrating advanced-level teaching and research.[50] Courant consciously emulated these characteristics in the United States in the development of NYU's mathematics institute and looked to the Russian educational system as building upon these similar values, demonstrating an admiration that becomes even more evident in his reports following his trips.

Courant traveled to the Soviet Union from May 16 to June 3, 1960, during which time he was primarily in Moscow, as well as in Leningrad and Tiflis for three days each. He gave a series of lectures in all three cities, as well as attended lectures and seminars, participated in informal and formal receptions, and visited with individuals personally. According to his report, there was not enough time for him to visit the scientific centers in Armenia and Siberia, as originally planned, however.

Upon his return, Courant wrote two reports (one full-length and one summary report) about his trip, which were distributed among NAS staff, as

49. Richard Courant to Sergei Sobolev, 8 Feb 1960, CC, Box 78, Folder 3 and CC, Box 88, Folder 17.

50. Richard Courant, "Reminiscences from Hilbert's Göttingen," *The Mathematical Intelligencer* 3, no. 4, (1981): 154–64. Also see Richard Courant, "Mathematical Education in Germany Before 1933," *The American Mathematical Monthly* 45, no. 9 (Nov 1938): 601–607; Richard Courant, "Felix Klein," *Die Naturwissenschaften* 37: 765–72.

well as to Shepard Stone at the Ford Foundation, Warren Weaver, and Courant's colleagues at NYU.[51] Courant began one of the NAS reports by stating that his "interest was primarily in the question of how scientific contacts can contribute to peaceful international relations." Given that the U-2 spy plane incident had occurred just weeks prior to his visit, Courant recognized that the first few days of his trip, "at least psychologically," were "somewhat affected by the political crisis," however noting that "very quickly these clouds disappeared and a spirit of complete enthusiastic friendliness prevailed without reserve. There was no doubt that a spirit of a friendly desire for close contacts existed everywhere and that the political setback had not resulted in hostility but rather disappointment and sorrow."

Courant's official NAS report of his 1960 trip illuminates the threads of commonality between the Russian mathematics educational system and Courant's thoughts and values about mathematics and the corresponding ideal institutional and educational frameworks. In describing Soviet mathematics—in terms of their scientific life, seminars, and views on applied mathematics—Courant revealed perhaps even more about his own thoughts on the ideal mathematical life, particularly referencing his experiences in Germany. Speaking to the "scientific life," as he called it, Courant described the Russian scientific activity as "vigorous, broad, and highly productive." Courant drew comparisons between the Russian "scientific life" to that of Western Europe, describing the Soviet Union's "first-rate, inspiring leaders around whom groups and scientific schools grow organically, much as they existed in the old pre-Hitler Germany and elsewhere in Europe and as we are trying to develop in the USA." Courant admired that in Moscow there was close cooperation among mathematics, physics, mechanics, and engineering.

Again, Courant drew comparisons among mathematical life between "the old Germany" and the Soviet Union by describing the seminars. He described seminars as being frequented by members of various institutes and lasting "for many hours, three or more." Courant made further comparisons by adding, "A number of these leading scientists gained their original inspiration, at least partially, in the old German universities such as Göttingen and Munich, and are consciously trying to preserve some of the spirit which prevailed, for example, in the circle around [Arnold] Sommerfeld and [David] Hilbert."

51. See Richard Courant, "Report by R. Courant on trip to Denmark, Poland, Russia and Western Europe—April 30 to July 4, 1960," 28 Jul 1960, CC, Box 90, Folder 4; Richard Courant, "Summary of Report," 28 Jul 1960, CC, Box 89, Folder 5.

Courant also hailed the Russian efforts in applied mathematics, commenting that in the USSR there is an "enthusiastic acceptance" of applied mathematics, as well as the communication between the sciences, and concluding that in these respects "the situation in USSR appears very much stronger than in Western countries." Courant clearly identified the elements of the Russian educational system that reflected the aspects of the German system, which he had consciously sought to emulate in the United States for decades.

Courant's reflections on the Soviet educational and training system blended his thoughts on the American and Western traditions readily within his analysis of the Soviet endeavors. In describing his impressions on Soviet computing, he recalled his visit to the Soviet Academy's computing center in Moscow under the direction of Anatoli Dorodnitsyn. Courant addressed the important difference between computing technology and the use of computers. He remarked, "In the USA and altogether in the West the development of computing machines has outpaced the training of people who can make reasonable use of these tools, and this gap is becoming more and more a threat. I am not sure that the Russians have completely succeeded in making the big computers servants of scientific progress rather than masters of an army of programmers, coders, etc. But certainly the Russians realize the problem and they are doing something about it on a large scale." Courant detailed that the Russian universities had chairs (or departments) in numerical analysis and that all students received at least basic training in that field. He remarked that the Academy-run centers were concentrated on research and service-oriented projects, while the university centers were focused on training, adding that the distinction was not clearly defined in Moscow. He remarked that the subjects being researched with computers were just as wide in the USSR as in the United States.

In describing access to Soviet colleagues and institutions, Courant consistently remarked that, usually after a time of acclimation, his Soviet colleagues welcomed him. To his readers, Courant represented the contact as a personal achievement, rather than an automatic product of the official framework of the visit. He stated that the conversations at the Soviet Academy's computing center in Moscow, for example, began in "an atmosphere of cautious reverse on the Russian side; but soon the ice was broken and the members of the Russian Institute volunteered eagerly to show me whatever interesting things they had in their institution," including unpublished accomplishments relevant to the construction of computing machines.

Decades later, Peter Lax remarked upon this trip in his NAS biography of Courant. Lax commented that Courant was "deeply concerned about the Cold

War" and "felt that the natural comradeship of scientists, in particular mathematicians, might set an example and overcome the 'us versus them' stereotypes."[52] Courant was frustrated by the demand for exact "reciprocity" in the exchange program and remarked upon his Soviet colleagues' limitations on foreign travel. Courant remarked on the general political climate, expressing that "Russian intellectuals, in particular scientists, apparently do not feel unfree, as long as they do not want to travel abroad or communicate intimately with people outside the border." Courant described that the system of approvals for allowing certain people to travel, but not others, is "often a mystery to everybody."

In examining Courant's early involvement with the NAS and his first trip to the Soviet Union, we gather an image of the mathematician Richard Courant. He could clearly navigate between the U.S. and USSR systems because of his émigré experiences, German training, and mathematical proficiency. He was respected by his Soviet peers, and he respected them; perhaps they saw each other as part of this community of elite scientists. Courant commented that in the Soviet Union "the social position of the scientist on the top of society is unchallenged." Courant admired the Soviet system of combining training and research, and having interdisciplinary efforts, which he recognized from his own German training and which he readily tried to emulate in the United States. Courant envisioned himself as an "ambassador" of sorts—a term he would begin using in preparation for the 1963 symposium—who could speak to the potential work mathematicians could do to contribute to international peace. In informing his American colleagues on the status of Soviet mathematics, science, and computing within the context of the general political environment, he also displayed his own views about the mathematics community and the ideal framework for international scientific diplomacy.

INTERVENING YEARS

Courant's activities with the NAS extended beyond being an official delegate of the NAS to the Soviet Union, as he was also involved in inviting Soviet scientists to visit the United States. During these negotiations, in which he corresponded with Soviet mathematicians and NAS officials, we again see Courant displaying his belief in an international community of scientists, as

52. Lax, "Richard Courant 1888–1972," (ref. 45).

well as his frustrations with bureaucratic reciprocity and secrecy. His efforts were met with some clear disappointments, including a substantial delay in the visit of Oleg Mikhailovich Belotserkovskii, a junior colleague of academician Dorodnitsyn.[53]

While visiting Dorodnitsyn's computing center, Courant had invited several Soviet mathematicians to the United States. Over the intervening years, NYU mathematician and Director of the NYU AEC Computing and Applied Mathematics Center Robert Richtmyer followed up on planning an NAS exchange visit between the computing centers in the Soviet Union and at NYU. Ricthmyer and Dorodnitsyn came to an agreement that Richtmyer, along with another colleague from NYU, would visit the Soviet computing center in exchange for two scientists working with Dorodnitsyn to visit the United States.[54] It was soon determined that Jack Schwartz would accompany Richtmyer and that Belotserkovskii and another Soviet colleague would visit the United States.[55] When Richtmyer's trip was cancelled for personal reasons, the reciprocal trip of Belotserkovskii and his colleague was then delayed by the State Department, which did not grant them visas because the original approval was based on the American scientists going to the Soviet Union first.[56] At this point, Courant intervened and wrote to Lawrence Mitchell, the NAS Section Head for Eastern Europe, that "the emphasis on the 'reciprocity' in the agreement is much exaggerated. I am convinced that the more Russian scientists come here[,] the better this country's interest is served. Every visitor to this country will go back with a more positive attitude toward us."[57] As time went on, more details unfolded about the delay. Mitchell informed Courant in May that "the situation was dependent upon the AEC's desire for more complete information about the proposal," also reiterating that the State Department wanted a clear two-way exchange in the field of computers,

53. M. K. Kerimov, L. I. Turchak, and A. S. Kholodov, "On the 80th Birthday of Academician Oleg Mikhailovich Belotserkovskii," *Computational Mathematics and Mathematical Physics* 46 no. 8 (2006): 1347–52. For more on Dorodnitzyn's role in the international community, see Ksenia Tatarchenko, "Cold War Origins of the International Federation for Information Processing," *IEEE Annals of the History of Computing* 32, no. 2 (2010): 46–57.

54. A. A. Dorodnitsyn to Robert Richtmyer, 25 Jan 1961, CC, Box 90, Folder 5.

55. Robert Richtmyer to A. A. Dorodnitsyn, 29 Mar 1961, CC, Box 90, Folder 5. At the beginning of the planning, Belotserkovskii intended to travel with N. V. Korolkov. Later in the planning, he was to be accompanied by Velihov instead; see CC, Box 90, Folders 5 and 6.

56. Robert Richtmyer to Frank G. Siscoe, 27 Mar 1962, CC Box 90, Folder 6. Frank G. Siscoe to Robert Richtmyer, 28 Mar 1962, CC Box 90, Folder 6.

57. Richard Courant to Lawrence C. Mitchell, 23 Mar 1962, CC Box 90, Folder 6.

adding, "You are aware, I am sure, that is a field in which the Soviet authorities seem especially keen to send their people to the United States."[58] Months later, Dorodnitsyn wrote to Courant that he had been informed by Mitchell that the refusal was issued because Belotserkovskii "is a specialist on rocket technique."[59] The letter concluded with Dorodnitsyn expressing his belief that Courant would be able to intervene.

Hugh L. Dryden, a NASA Deputy Administrator, wrote to Walter B. Gleason in the Office of the Foreign Secretary at the NAS that the Academy "would be ill-advised to proceed" with approving Belotserkovskii's visit "in the face of a unanimous adverse recommendation on the Department of State, Department of Defense, and the Atomic Energy Commission." Dryden, privy to Courant's request, added that he was sympathetic to Courant's "point of view that on the basis of personal knowledge Dr. Belotserkovskii's interest is in numerical analysis rather than computer technology . . . it is quite probable that the departments which have objected have additional information with respect to the classified publications of Dr. Belotserkovskiy [*sic*]."[60]

Following a personal visit to the NAS to speak about his views on Belotserkovskii's visit, Courant seemed to have succeeded in securing the visit. He wrote to Dorodnitsyn that Belotserkovskii's visit would soon be arranged.[61] Mitchell assured Courant that the NAS would be requesting that the Department of State reconsider the case. Courant replied that his real concern was "that the refusal of a visa had a rather bad effect on our well-meaning friends in the Soviet Academy."[62]

That following November, Mitchell wrote to Courant that the NAS reconsidered "*l'affaire Belotserkovskiy*" and were informed that the Department of State no longer had any objection to the visit.[63] In December, Courant received word from the NAS that Belotserkovskii had been approved to spend two and a half months at NYU and then another two weeks visiting other scientists. The next challenge was to receive permission to show Belotserkovskii the AEC supercomputer, which was being operated at NYU's Institute of

58. Mitchell to Richard Courant, 15 May 1962, CC, Box 90, Folder 6.

59. AA. Dorodnitsyn to Richard Courant, 15 Sep 1962, CC Box 90, Folder 6.

60. Hugh L. Dryden to Walter B. Gleason, 3 Oct 1962, CC Box 90, Folder 6.

61. Richard Courant to A. A. Dorodnitsyn, 19 Nov 1962, CC, Box 90, Folder 6. Mitchell to Richard Courant, 19 Nov 1962, CC, Box 66, Folder 9.

62. Richard Courant to Mitchell, 26 Nov 1962, CC, Box 66, Folder 9.

63. Mitchell to Richard Courant, 29 Nov 1962, CC, Box 90, Folder 11.

Mathematical Sciences. Mitchell informed Courant that the AEC would allow him to make a casual visit to see the supercomputer, however, Belotserkovskii was not to be given any maintenance or training manuals, nor should he be allowed to partake in discussions about technical matters with the engineers.[64] Courant thus managed to navigate the security interests of the Cold War state, even as he pushed for more individual connections between mathematicians on both sides of the divide.

"A SORT OF AMBASSADOR": THE 1963 JOINT ACADEMY SYMPOSIUM ON PARTIAL DIFFERENTIAL EQUATIONS

In August 1963, Courant led a delegation of nearly two dozen American mathematicians to visit Akademgorodok outside of Novosibirsk, Siberia, to attend a joint academy symposium.[65] Courant's involvement was pivotal. He chaired the delegation selection committee and the actual delegation of American mathematicians itself, played an instrumental role in planning the symposium, and following the symposium, circulated reports and letters analyzing the value of such exchanges. Courant revealed his ideologies about the mathematics discipline, reiterating much of his prior thoughts from his 1960 reports with regard to the ideal institutional framework. But the 1963 symposium experience added more nuance to his thoughts on the mathematical community, particularly revealing poignant insights into his conception of the mathematicians on this trip as "a sort of ambassador."[66]

The interacademy exchange agreement, which had been renewed in the intervening years, called for joint symposia between the two nations. The first symposium, which focused on Radio Astronomy, was held in the United States at the National Radio Astronomy Observatory in Green Bank, West Virginia, and Washington, D.C. In August 1962, the USSR Academy Vice President M. D. Millionschchikov proposed that the second symposium should be held in Novosibirsk for two weeks and focus on partial differential

64. Mitchell to Richard Courant, 12 Feb 1963, CC, Box 66, Folder 9.

65. For more on the ideological foundation of Akademgorodok, see: Paul R. Josephson, *New Atlantis Revisited: Akademgorodok, the Siberian City of Science* (Princeton, NJ: Princeton University Press, 1997); and Ksenia Tatarchenko, "A House with the Window to the West: The Akademgorodok Computer Center (1958–1993)" (PhD dissertation, Princeton University, 2013).

66. Courant referred to a U.S. mathematician partaking in the exchange program as "a sort of ambassador." Richard Courant to Charles Morrey and Marston Morse, 11 Feb 1963, CC, Box 90, Folder 10.

equations.[67] The original proposal, sent to the NAS President Frederick Seitz, called for papers within the theory of partial differential equations, boundary value problems, spectral theory of linear operators, equations of a special type, elliptical type on two-dimensional manifolds, quasi-conformal mapping, and numerical methods.[68] The topic was fitting as the Soviet Union had a strong tradition in such lines of research.

Millionschchikov added that the U.S. delegation could be fifteen mathematicians, to be selected by the U.S. NAS. He also included his own list of mathematicians that he recommended for inclusion in the symposium, including six from NYU. This document, held in the Courant archival collection, was followed by a handwritten note stating, "Vekua's list."[69] The list read: Courant, Bers, Friedrichs, Nirenberg, Lax, Zygmund, Stone (Chicago), Ahlfors (Harvard), Lewy (Berkeley), Henrici (UCLA), Nitsche (Minnesota), Schechter (NYU), Protter (Berkeley), Bergman (Stanford), and Kodaira (Princeton). (Although Bers planned on attending the symposium, he did spend a few days in Moscow but did not go to Novosibirsk, as he was called to Rome on a family emergency.)

From the start, Courant was intimately involved in the symposium, having already discussed his hopes of visiting Novosibirsk with Soviet mathematicians and NAS officials, and appearing on the top of the Soviet Academy's list of recommended participants. Courant wrote to the NAS-NRC chair, Edward McShane, commenting that he had urged his Soviet colleagues to allow Americans to visit Novosibirsk.[70] The NAS officially accepted the Soviet invitation in December 1962.[71] Thus, the bulk of the planning for the conference occurred in the wake of the Cuban Missile Crisis and amidst fears over nuclear war. Within this context, Courant was asked to serve as chair of the selection committee. His activities in this role illuminate his understanding of the significance of this exchange program—specifically the diplomatic importance of selecting mathematicians who were not only scientifically worthy, but also could serve as friendly ambassadors.

The selection of the delegates was a sensitive matter. Courant and his committee spent months negotiating who was in, who was out, and who was

67. M. D. Millionschchikov to Frederick Seitz, 31 Aug 1962, CC, Box 90, Folder 6 and Folder 11. Millionschchikov's title on the correspondence reads "Acting President."

68. M. D. Millionschchikov to Frederick Seitz, 31 Aug 1962, CC, Box 90, Folder 6 and Folder 11.

69. M. D. Millionschchikov to Frederick Seitz, 31 Aug 1962, CC, Box 90, Folder 11.

70. Richard Courant to Edward McShane, 1 Oct 1962, CC, Box 90, Folder 11.

71. Harrison Brown to Richard Courant, 3 Dec 1962, CC, Box 90, Folder 11.

available. It was a juggling act of finding the right people in terms of mathematical reputation, "suitable personalities" as a "sort of ambassador," the Soviet Academy's preferences, and an appropriate representation from a variety of universities. The committee members did not always agree on what their priorities should be.

At the request of the NAS, Courant's selection committee for the U.S. participants in the symposium were Charles Morrey, from the University of California, Berkeley, and Marston Morse, from the Institute for Advanced Study. Morse and Pavel Alexandrov had served together as Vice Presidents of the International Mathematical Union's executive committee.[72] Courant, Morrey, and Morse began by drawing up their own lists, pulling from the recommended list provided by the Soviet Academy, and taking into account outside opinions. NAS official Harrison Brown recommended sending the two numerical analysts, Robert Richtmyer and Jim Douglas.[73] Lipman Bers, who was particularly interested in international relations, suggested sending Garrett Birkhoff, Paul Garabedian, and Joseph Keller, among others.[74]

Some, particularly Bers, felt it would be "desirable on moral and scientific grounds" to strictly adhere to the Russian list.[75] Morse felt that not more than half the names should be from NYU, to ensure a "maximum effect on this country."[76] Courant, having received written agreement from I. N. Vekua, Sobolev, and Lavrentyev that the Soviet list was not binding, disagreed with Bers' "moralizing tone."[77] Also, Courant did not think the geographical diversity of the American mathematicians was important, as the selection should be "primarily dictated by our wish to improve scientific relations for USA."[78] Courant maintained that the true value of the symposium was to improve scientific relations between the countries, which demanded a careful selection of appropriate delegates, regardless of their home university or even scientific brilliance. If the individual for consideration would not make a good ambassador, he (all the delegates up for consideration were male) did not make the list. Courant articulated his thoughts on the delegation selection:

72. Lehto, *Mathematics without Borders* (ref. 36), 141.

73. Richard Courant to Marston Morse, 4 Dec 1962, CC, Box 90, Folder 11.

74. Richard Courant to Marston Morse, 10 Dec 1962, CC, Box 90, Folder 11.

75. Lipman Bers to Richard Courant, Marston Morse, and Charles Morrey, 8 Jan 1963, CC, Box 90, Folder 10.

76. Marston Morse to Richard Courant and Charles Morrey, 17 Jan 1963, CC, Box 90, Folder 10.

77. Richard Courant to Charles Morrey and Marston Morse, 11 Feb 1963, CC, Box 90, Folder 10.

78. Richard Courant to Marston Morse, 26 Jan 1963, CC, Box 90, Folder 10.

> Certainly while trying to accommodate the Russian suggestions we must use our own judgment. I consider the meeting in Novosibirsk as a unique opportunity to work for the improvement of international relations; particularly careful selection of the delegation is important, not only from the point of view of scientific merits but just as much from the point of view that delegates should be suitable personalities. Therefore, my positive and negative suggestions should be in no way interpreted as a presumptuous scientific judgment.[79]

Personal identity and international diplomacy always went hand-in-hand for Courant.

Just months before the symposium, the Soviet Academy officially approved the U.S. delegation to expand to twenty-five mathematicians. Courant invited additional colleagues, including Birkhoff, Felix E. Browder, James B. Serrin, Stefan Bergman, Robert Finn, Charles Loewner, Johannes Nitsche, and Martin Schecter. Courant had previously written to Vekua requesting that Morse be invited. In the end, the official U.S. NAS delegation to Novosibirsk included twenty-three mathematicians. The delegation was accompanied by Natasha Brunswick, who was not officially an NAS delegate but an active member in the symposium as a translator.

Courant, who did not speak Russian, requested that Brunswick accompany him on the trip as an interpreter. Brunswick, born in St. Petersburg, had studied mathematics at the University of Hamburg and served as technical editor for the NYU Institute of Mathematical Sciences' journal *Communications on Pure and Applied Mathematics* since 1948, and as the primary translation editor for the journal *Theory of Probability and Its Applications* since 1956. Courant recognized that "most of the other members of the delegation" were unable to speak or read Russian as well, and described Brunswick herself as a mathematician and journal editor.[80] When writing to Vekua for permission to have Brunswick accompany the delegation, Courant explained that he believed that both Vekua and Sobolev had met her, that she was the former wife of Emil Artin, and was the official translator of Russian papers for the American Mathematical Society (AMS).[81] Mitchell described Brunswick as "qualified both linguistically and mathematically for interpretation." In the end, the NAS recognized her as a "special assistant to the head of the

79. Richard Courant to Charles Morrey and Marston Morse, 11 Feb 1963, CC, Box 90, Folder 10.

80. Richard Courant, 1963, "Itinerary and Incidentals of Travels in Europe and U.S.A.," CC, Box 89, Folder 6.

81. Richard Courant to I. N. Vekua, 27 May 1963, CC, Box 90, Folder 12.

delegation," but she was not considered a delegate herself, nor was she eligible for reimbursement for her travel expenses, part of which Courant personally funded and later requested to be reimbursed for.[82]

On the request of the Soviet Academy, Courant collected the delegates' papers ahead of time so that all of the pieces could be distributed among the participants in both Russian and English. Through the spring of 1963, contacts between the U.S. and USSR mathematicians and plans for the symposium expanded. Sobolev and his wife came to the United States as guests of the AMS and visited NYU on their trip. Mitchell from the NAS distributed Sobolev's itinerary to the symposium participants.[83] Yale mathematician Felix E. Browder, who would later be added to the delegation, also met with Sobolev.

The Joint Soviet-American Symposium on Partial Differential Equations took place in August 1963, and included the twenty-four American visitors and over a hundred Soviet mathematicians. More than four decades later, Louis Nirenberg warmly described the experience as "like being on board a ship for two weeks. You make friends immediately. And I've kept friends, a number of friends, since then."[84] Lax commented that the symposium "was a golden time and gave rise to friendships that lasted lifetimes."[85] Over the entirety of his career, Lax reported that he visited the Soviet Union eight times, claiming that "there was a very close relation between the Soviet mathematicians and the Americans. Cold War or no Cold War. Very close, very warm."[86] Expressing himself with his classic wit, Lax commented that at the symposium, "Vodka flowed like water."[87]

Following the symposium, Courant submitted a seven-page report on his experiences in the Soviet Union. The report, written for the NAS, was widely distributed among NAS officials, as well as others from the Department of State, the National Science Foundation, the AEC, Department of Commerce, the Department of Defense, National Aeronautics and Space Administration, the Office of Naval Research, American Council of Learned Societies, and the Inter-University Committee on Travel Grants.[88]

82. Richard Courant, 1963, "Itinerary and Incidentals of Travels in Europe and U.S.A.," CC, Box 89, Folder 6.

83. Lawrence C. Mitchell to U.S. Symposium Participants, 16 Apr 1963, CC, Box 90, Folder 10.

84. Louis Nirenberg, interview with the author, New York City, 29 May 2008.

85. Peter D. Lax, "Richard Courant 1888–1972," (ref. 45), 92.

86. Peter D. Lax, interview with the author, New York City, 3 Jul 2008.

87. Ibid.

88. Lawrence C. Mitchell to distribution list, 26 Nov 1963, NAS Archive, ADM: IR: East-West Exchange: Symposium on Partial Differential Equations: Rpt.

Courant described the twelve-day symposium as a "stirring experience" for the U.S. delegation.[89] Recognizing that Akademgorodok outside of Novosibirsk had been "until recently practically out of bounds for foreigners," Courant appreciated the significance of the experience. He stated that they "lived in completely open and cordial contact with a large number of Russian colleagues of all age groups," adding that, "the hospitality was overwhelming." While appreciating the scientific content of the meeting, Courant reported that "far beyond that," they gained insight into the Russian educational and research effort.[90]

Courant's description of Akademgorodok reiterates his view of the importance of the broader educational effort in the Soviet Union. Courant described Akademgorodok as "the result of a most remarkable large-scale effort towards improving scientific training combined with research," drawing a comparison to the founding of the École Polytechnique. Courant continued to explain the background of Akademgorodok, including the Soviet's twentieth party congress's conclusion for the need for decentralization. Developed under the leadership of Lavrentyev, with assistance from Vekua and Sobolev, Akademgorodok contained twenty Academy institutes, a university, housing, schools, and a hospital. Courant added that the number of institutes was expected to double in a few years. He also commented that the primary incentive for scientists to relocate to Novosibirsk was not monetary, but rather "the wide open space" and "the uniquely good and stimulating scientific atmosphere," complemented by recreational facilities, cultural institutions, and quality schooling.

Parts of the 1963 report clearly echoed themes from his 1960 reports, including his admiration for "the high level of competence" in Russian mathematics. Again, Courant reported that the Russian mathematicians fostered a close interaction between pure and applied mathematics, as well as a greater interaction between mathematics and other fields, such as physics and engineering, than can be found in the United States. Courant made specific reference to top Russian mathematicians who made significant contributions to the applied sciences, including the topologist Lev Pontriagin's contributions to optimization problems, Israel Gelfand's work on the physiology of the nervous system,

89. Richard Courant, "Joint Symposium on Partial Differential Equations," 19–30 Aug 1963, CC, Box 70, Folder 23. The same report is also available at NAS Archive, ADM: IR: East-West Exchange: Symposium on Partial Differential Equations: Rpt.

90. Ibid.

and Kolmogorov's interests in celestial mechanics, probability, and fluid dynamics. He remarked that attention was due to the expansive "Russian effort in education combined with research, a very broad effort which may well be more significant than spectacular specific Russian scientific and technological achievements."

Also similar to his 1960 reports on his visit to the computing center in Moscow, Courant stated that the computing center in Novosibirsk was "shown very openly to me and to my expert colleagues." Courant described the center as being staffed with "excellent" scientists, with plans for expanding the staff up to 400 people within the year. Courant commented that although the technological equipment was behind that in the United States, "the practical and theoretical work being done in the art of electronic computing" was "impressive." In fact, Courant claimed that this "technological backwardness may be a boon to the Russians because it has stimulated the development of improved scientific techniques and methods of computing." He added that some of the scientists would like to buy American computers, and seemed to be negotiating with British, and possibly German, computer manufacturing firms.

Courant also reported on the political pulse of the scientists with whom he spoke. Drawing a comparison from his prior trip in 1960, Courant described that "a spirit of quiet self-assurance among Soviet mathematicians appeared greatly strengthened compared to the situation I found in Russia three years ago." He described the symposium as providing "daily opportunities for frank personal talks," from which he concluded that "it was striking to realize that communist dogma plays very little, if any, role for most of these people, in particular not for the young people." Courant added, "They are loyal to their country, but they are openly eager to learn about different ways of social and economic life. The desire to visit the USA not as mere sightseers but rather as participants in American life and work is universal."

Although Courant did not expand on exactly how such scientific exchanges would contribute to international peace, he strongly supported the program's expansion. It is conceivable, and perhaps likely, that Courant imagined an international community of mathematicians being able to successfully navigate through political borders on the basis of the commonality of their mathematical research and their shared social position. Courant concluded his report wanting to "express emphatically the expectation that scientific cooperation can do very much indeed for the cause of peaceful coexistence." With regard to the potential for future exchanges, Courant remarked, "Every young Russian

scientist is anxious to visit USA and to participate in work here. They are fascinated and attracted by Western ways." Courant recommended that "a much broader and enhanced exchange of visitors (without formal reciprocity) [should] be as informal as possible." He argued, "The benefit would be mutual and the psychological gain for us considerable." Indeed, Courant had remarked upon the frustrations of bureaucratic oversight and equal reciprocity in the exchanges as a barrier to their success. Perhaps he imagined that such formalities were less necessary within the international mathematics community.

In his correspondence with NAS officials and Soviet mathematicians in the months following the symposium, Courant expanded on his thoughts on the importance of continued exchange programs, particularly among younger scientists. These sentiments reverberate with an ideology of a mathematics community capable of permeating political borders. Courant wrote to the NAS's Foreign Secretary Harrison Brown, for example, reiterating that the exchange of young scientists would be particularly beneficial for international peace: "such informal visits, if they are not just perfunctory and brief, could contribute definitely to bridging the still existing psychological gaps and to drawing the younger people much more into the orbit of Western thinking and living."[91] The following February, Brown negotiated a renewal of the exchange agreement in Moscow, with the significant change that visits be arranged by nominating the scientist, rather than the area of research, first.[92] This change vindicated Courant's overriding emphasis on the people involved in scientific exchanges: scientific diplomacy followed personnel considerations.

Following the symposium, Courant corresponded with his Soviet colleagues from a vacation in Pontresina, Switzerland. In these correspondences, Courant's emphasis on the mathematics community—and its potential to aid international peace—is strikingly clear. Courant wrote to Lavrentyev, whose wife and son he met on the trip, that the symposium "will certainly contribute very much to the intensified development of relations between scientists of our countries, relations which also must extend into the realm of personal friendship."[93] Courant followed up that November, with remarks about Lavrentyev's upcoming trip to the United States. Similarly, Courant wrote to Vekua,

91. Richard Courant to Harrison Brown, 14 Oct 1963, CC, Box 90, Folder 15.

92. Frederick Seitz to Members of the National Academy of Sciences, 21 May 1964, CC, Box 90, Folder 9.

93. Richard Courant to Mikhail Lavrentyev, 8 Sep 1963, CC, Box 90, Folder 15.

thanking him for his and his wife's hospitality, describing the symposium as a "wonderful scientific and human experience" that will result in a "lasting effort towards improving relations and contacts."[94] Vekua replied to Courant's letter by sending him a scrapbook filled with photographs from the meeting. The photographs included images from inside the lecture halls, as well as outdoor scenes from a boat and a forested area.[95]

"NO BOUNDARIES IN SCIENCE"

Over the following years, Courant sustained efforts in encouraging a number of Soviet mathematicians to visit the United States. In February 1964, Lavrentyev wrote to Courant that his visit to the United States had been "very instructive and pleasant," adding that he was very interested in the "University towns of Princeton and Stanford" as they reminded him of the academic town outside of Novosibirsk.[96] Lavrentyev also met Hans Lewy in Berkeley and expressed his wishes for Courant to return a visit as well. In April 1964, Courant invited Alexandroff, Kolmogorov, and Petrovsky to visit NYU's IMS. Courant wrote to USSR Academy President Keldysh, expressing that following the symposium it had become "apparent that closer contact between the Institute of Mathematical Sciences in New York University and the mathematical centers in Novosibirsk should be organized," adding that Lax had written to Sobolev inviting Mikhail Lavrentyev's son, also named Mikhail, and his wife.[97] Although the invitation to Lavrentyev's son and daughter-in-law was originally accepted, the trip was canceled due to pressing work. Other exchanges included correspondence between Courant and Vekua, who wrote to thank Courant following Vekua's visit to an NAS meeting.

Courant maintained involvement with the international mathematics community by attending other international meetings, which he reported to Harrison Brown at the NAS. Following the five-day Wieserstrasse Memorial Meeting at the Deutsche Akademie der Wissenschaften in East Berlin in October 1965, Courant wrote a four-page letter to Brown describing the meeting. Courant reported on the Academy's and some of the universities'

94. Richard Courant to I. N. Vekua, 8 Sep 1963, CC, Box 90, Folder 15.

95. I. N. Vekua to Richard Courant, scrapbook, [undated (probably 1963)], CC, Box 12, Folder 5.

96. Mikhail Lavrentyev to Richard Courant, 18 Feb 1964, CC, Box 78, Folder 1.

97. Richard Courant to Mstislav Keldysh, 11 Aug 1964, CC, Box 78, Folder 1.

commitment to "build science anew on the ruins of the past," adding that, "the existence of many talented and idealistic young scientists and students promises success of these efforts."[98] Courant recognized the "isolation of East Germany from the West" by the home countries of the participants. He concluded, "I feel certain that it would be in the interest of science and of relaxing international tensions, if possibilities could be explored to open some holes in the double iron curtain which isolates science in East Germany from the Western world."

Courant's Cold War scientific activities within the international community received perhaps their greatest recognition when the Soviet Academy announced Courant had been elected as a member. In February 1966, the Soviet Academy announced that it had elected three U.S. scientists, bringing the total of U.S. members to six. The other two scientists were Severo Ochoa, a Nobel laureate biochemist from NYU's College of Medicine, and Herman F. March, a chemist from the Polytechnic Institute in Brooklyn. The previous three U.S. scientists who had been elected were Bronk, Linus Pauling, and Peter Debye.[99] The *New York Times* ran two stories about the elections. In an article titled "No Boundaries in Science," the *New York Times* pointed to the particular significance of the elections given the current political tensions over Vietnam.[100] Courant was flooded with remarks of congratulations from his colleagues the world over, including Keldysh, Sobolev, Bogoliubov, Vekua, and Lavrentyev; Hirsch Cohen and R. E. Gomory from IBM; Raymond Seeger from the NSF; G. I. Marchuk from the Novosibirsk Computing Center; Thomas Killian from the University of Portland; Gordon L. Walker, the AMS Executive Director; and Brown from the NAS.[101]

Courant's final trip to the Soviet Union as an official delegate for the interacademy exchange program occurred in October 1967.[102] As a foreign member of the Soviet Academy of Sciences, he attended the Academy meeting in honor of the fiftieth anniversary of the October Revolution.[103] He visited

98. Richard Courant to Harrison Brown, 4 Nov 1965, CC, Box 65, Folder 15.

99. Harry Schwartz, "3 Scientists in U.S. are Elected to Soviet Academy," *New York Times*, 12 Feb 1966.

100. "No Boundaries in Science," *New York Times*, 14 Feb 1966.

101. See CC, Box 39, Folders 12 and 13.

102. Courant would return to the Soviet Union in 1970 as a guest of the Soviet Academy of Sciences, but not as an official delegate under the auspices of the interacademy exchange program.

103. P. S. Aleksandrov and O. A. Oleinik, "In Memory of Richard Courant," *Russian Math. Surveys* 30, no. 4 (1975): 157–78; from *Uspekhi Mat. Nauk* 30, no. 4 (1975): 205–26.

the Soviet Union for three weeks and was accompanied by Ilona Nakoinz, a student preparing for medical school who served as Courant's private secretary.[104] In his NAS report on the trip, Courant again commented on the "hospitality and openness" of his Soviet colleagues. Courant reiterated: "Individual Soviet scientists, compared to Americans, are no supermen. Nevertheless, mathematicians could learn much from general attitudes in the USSR. In Soviet mathematics, theoretical and abstract activities are balanced with viewpoints of mechanics, physics, engineering, and applications in many fields—from geophysics to physiologic. The interaction in the USSR between theoretical and applied science again impressed me."[105] Courant's unwavering admiration for the Russian traditions in mathematics was clear; no less clear was his desire to emulate the broad, interdisciplinary approach to mathematics in the United States.

Although many of the sentiments expressed were similar to his earlier reports, Courant did distinguish an improved standard of living from his prior trip. Courant also reported on the expanded computing center in Akademgorodok. In his two-page report on the Akademgorodok computing center, Courant reported that the center now had about 500 employees and was under the direction of Professor G. I. Marchuk.[106] He described Marchuk as "extremely open and anxious for cooperation." Courant commented, again, that on the technological level, the Soviet computers were "still lagging considerably behind" the United States, but "great strides have been made." New transistorized computers were being delivered, which he reported would be comparable to the IBM 790 or 794 or the CDC 3600, and would soon be followed by a computer comparable to the CDC 6600. Courant added, "It is thought provoking that the development of computing and computers in the USSR seems closely integrated with attacks on large scale problems in various fields," pointing to examples such as computational methods for geophysical exploration and weather problems. Courant commented that the staff there wished to

104. Ilona Nakoinz USSR Visa Application, Sep 1967, CC, Box 89, Folder 8.

105. Richard Courant, "Report about trip to USSR, October 20 to November 11, 1967," 13 Dec 1967, CC, Box 90, Folder 9.

106. For more on G. I. Marchuk's transnational efforts in computing, see Ksenia Tatarchenko, "Lions—Marchuk: The Soviet French Cooperation in Computing," in *Perspectives on Soviet and Russian Computing: First IFIP WG 9.7 Conference, SoRuCom 2006, Petrozavodsk, Russia, July 3–7, 2006, Revisited Selected Papers*, ed. John Impagliozzo and Eduard Proydakov (Springer, 2011), 235–42.

have IBM equipment, and that there should be contact improved between, for example, IBM and the Computing Center.[107]

Outside of the interacademy exchange program, Courant returned to the Soviet Union in April 1970 as a guest of the Soviet Academy to attend the Jubilee Session of the General Assembly dedicated to the 100 year celebration of Lenin's birthday in Moscow. He was also invited to a Tbilisi meeting in September 1971, but could not attend due to declining health. He died in January 1972. Following Courant's death, Alexandrov and Oleinik wrote his memorial for the *Russian Mathematical Surveys*, in which they remarked that "Courant constantly tried to extend and deepen scientific contacts with Soviet mathematicians in the interests of the progress of mathematical science and in the interests of both nations."[108] Both sides of the exchange recognized the significance of Courant's efforts to expand networks of mathematicians in the service of national and international interests.

CONCLUSION

In the postwar era, the Courant Institute of Mathematical Sciences would emerge as a prototype of the academic-industrial-military complex. Certainly, Courant's identity as a trusted government contractor was complicated by his scientific diplomatic work. Under the auspices of the Navy, Courant would travel to postwar Europe, and later, under the auspices of the NAS, he would travel to the Soviet Union as an "ambassador" and host Soviet colleagues in the United States. These exchanges were fraught with complexity. On one hand, Courant served as an informant, reporting back on his impressions of the status of scientific life in Europe and the Soviet Union to his peers in the American government and private foundations. On the other hand, Courant was outspoken that mathematicians could contribute to international peace through such friendly scientific exchanges. Both aspects emphasize, however, the way he put an elite international network of mathematicians at the forefront of scientific diplomacy. The applied nature of his work garnered national respect

107. Richard Courant, "Observations about computing in the USSR," 27 Nov 1967, CC, Box 90, Folder 9.

108. P. S. Aleksandrov and O. A. Oleinik, "In Memory of Richard Courant," *Russian Math. Surveys* 30, no. 4 (1975): 157–78, on 162; from *Uspekhi Mat. Nauk* 30, no. 4 (1975): 205–26.

and military funding; his emphasis on the claimed universality of mathematicians' identity allowed him to function as a Cold War international diplomat.

In studying these various scientific activities, a portrait of Courant's scientific ideology and his faith in a truly international mathematics community emerge. Courant admired the Russian system of mathematics education and research, a tradition he often compared to his own training in Germany and that he tried to emulate in the United States. He envisioned mathematics as encompassing both pure and applied fields, being enriched by a broad, interdisciplinary approach, and thriving with a combination of high-level training and research through dynamic seminars and interdisciplinary groups. In his participation with the interacademy exchange program, it becomes clear that Courant held an ideology of mathematics itself as a form of knowledge capable of traveling across borders, even politically contentious ones. And perhaps most poignantly, we see Courant's implied understanding of an international mathematics community. Having a commonality of mathematical training meant that he could transport himself to a foreign country and, with the aid of a translator, engage in meaningful intellectual discussions. This functioned particularly well for him in the Soviet Union, where he reconnected with colleagues whom he admired for their similarly elite educational background.

After a lifetime of political disruption involving two world wars and forced emigration, Courant had developed a broad perspective on the relationship between mathematics and society. Time and again, mathematics served as a constant in his life and his ticket from one place to another. It is no wonder that the skill set that provided him refuge in a foreign country in the 1930s and decades of institutional funding throughout the Second World War and the postwar and Cold War eras, would be the foundation upon which he would envision his own identity in diplomatic efforts. Mathematics transcended borders for Courant; the mathematician ought to be able to do the same.

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