

Curriculum Vita

Evguenii Rakhmanov

Born: July 7, 1952, in Moscow, USSR

Address:

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Department of Mathematics, University of South Florida,
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Education:

Doctor of Science in Physics and Mathematics, Steklov Mathematical Institute, 1983. The degree of Doctor of Science in Russia is equivalent to European degree Doctor of Science (Second Doctor)

Candidate of Science in Physics and Mathematics (Ph.D.). Steklov Math. Institute, 1977.

Postgraduate Course, Steklov Math. Institute, 1974–1977

Diploma in Mathematics (M.D.) Moscow University, 1974

Moscow University, Mechanics-Mathematics Faculty, 1969–1974

Positions:

Professor, University of South Florida, 1999–present

Associate Professor, University of South Florida, 1995–1999

Adviser, Steklov Mathematical Institute 2000–present.

Leading Researcher, Steklov Mathematical Institute 1989-2000.

Associate Professor (part time), Moscow University, Mech.–Math. Faculty, 1990–

1994

Assistant Professor (part time), Moscow University, Mech.–Math. Faculty, 1988–1990

Senior Researcher, Steklov Math. Inst. 1983–1989

Junior Researcher, Steklov Math. Inst. 1977–1983

Held several sort term visiting positions, in particular: University of Saragosa, 1989 (two months), Technical University in Berlin 1992 (one month), University of Almeria, 2002 (four month)

Grants:

NSF Grant DMS – 9501130, “Minimal Discrete Energy Problem and Approximation Theory,” co-principal investigator (with E. Saff), 1995–1997, \$171,000.

NSF Grant DMS – 9801677, “Extremal problems, Orthogonal polynomials and Approximation theory,” co-principal investigator (with E. Saff), 1998–200,

Awards:

Award for the Best Result of the Year from the Academy of Sciences of USSR for the solution of so called “1/9” problem in the Theory of Rational Approximation of Analytic Functions, (with A. A. Gonchar), 1987.

Award for the Best Result of the Year from the Steklov Mathematical Institute for theorems on Asymptotics for Orthogonal Polynomials on the Real Axis, 1982

Award for the Best Result of the Year from the Steklov Mathematical Institute for the Solution of Steklov Problem in the Theory of Orthogonal Polynomials, 1980

Invited Lectures Presented at International Conferences and Seminars:

1. *Stieltjes Polynomials and Critical measures*, International Conference devoted to 60th birthday of Guillermo Lopez Lagomasino, Madrid, Spain, 2008.
2. *Problem of equilibrium in a conducting domain and its applications*, International Conference “Kolmogorov and Contemporary Mathematics” devoted to 100th birthday of A.N.Kolmogorov, Moscow University, 2004.

3. *Critical measures and Compacts with S-property*, International Conference on Minimal energy problems, City University of Honk Kong 1999 .
4. *Asymptotics for Orthogonal Polynomials of a Discrete Variable*, Eighth Symposium on Orthogonal Polynomials and Their Applications, Sevilla, Spain, 1997.
5. *On the Bounds of Polynomials Normalized in a Discrete Norm*, International Conference on Functional Spaces, Approximation Theory and Nonlinear Analysis, Moscow, 1995.
6. *Equilibrium Distributions in Approximation Theory and Asymptotics of Orthogonal Polynomials*, Seminar on the Theory of Functions, Odessa, Ukraine, 1992.
7. *Equilibrium Measures and their Applications*, Conference in Approximation Theory, Oberwolfach, Germany, 1990.
8. *Equilibrium Measures and Asymptotics for Orthogonal Polynomials*, US-USSR Joint Conference in Approximation Theory, Tampa, Florida, USA, 1989.
9. *Strong and Logarithmic Asymptotics for Orthogonal Polynomials on \mathbb{R}* , Seminar on Rational Approximation and Orthogonal Polynomials, Saragoza, Spain, 1988.
10. *Equilibrium for Vector Potentials with Applications in Approximation Theory*, Seminar on Approximation and Optimization, Habana, Cuba, 1987
11. *Rational Approximation for e^{-x} on R_+* , Conference in Complex Analysis, Varna, Bulgaria, 1987.
12. *Rational Approximations, Orthogonal Polynomials and Equilibrium Distribution*, Conference in Orthogonal Polynomials and their Applications, Segovia, Spain, 1986.
13. *Rational Approximation of Analytic Functions*, Semester for Complex Analysis and Approximation Theory, Banach Center, Warsaw, Poland, 1986.
14. *Asymptotics of Orthogonal Polynomials on \mathbb{R} and Weighted polynomial Approximation on \mathbb{R}* , Conference on the Theory of Functions, Kiev, 1982.

Other Presentations 1989–1997

- *On the Asymptotic of Stieltjes Polynomials*, University of Indianapolis 2009, Colloquium.

- *On the Asymptotic of Discrete Orthogonal Polynomials*, University of South Carolina, 1996, Colloquium.
- *Zero Distribution of Discrete Tchebyshev Polynomials*, Regional AMS conference in approximation theory, Orlando, 1995.
- *Multipoint Padé Approximants for Analytic Functions*, Kent State University, 1993, Colloquium.
- *Applications of Potential Theory in Orthogonal Polynomials*, Ohio State University, 1993, Colloquium.
- *Distribution Points on the Sphere*, USC, 1992, Colloquium.
- *Interpolation by Rational Functions*, Georgia Tech 1992, Colloquium.
- *Equilibrium Measure on the Line*, Technical University in Berlin, 1992, Colloquium.
- *Electrostatic Interpretation of Zeros of Orthogonal Polynomials*, Madrid University, 1989, Colloquium.
- *Strong Asymptotics for Orthogonal Polynomials*, University of Saragosa, 1989.

List of Main Publications

Evgenii A. Rakhmanov, Refereed Works

1. *On the Asymptotic of the Ratio of Orthogonal Polynomials*, Mat. Sb. 103 (145), 1977, 237–252; English Translation in Math. USSR Sb. 32 (1977), 199–213.
2. *On the Convergence Of Diagonal Padé Approximants*, Mat. Sb. 104 (146) (1977), 271–291; English Translation in Math. USSR Sb. 33 (1977).
3. *On the Convergence Of Diagonal Padé Approximants of Markov Type Functions*, Candidate Dissertation, 1978, Steklov Math. Inst., Moscow.
4. *On the Convergence Of Diagonal Padé Approximants of Markov Type Functions*, Thesis of Candidate Dissertation, 1978, Steklov Math. Inst., Moscow.
5. *On the Steklov Conjecture in the Theory of Orthogonal Polynomials*, Mat. Sb., (1979); English Translation in Math. USSR Sb.

6. *On the Convergence of Padé Approximants in Classes of Holomorphic Functions*, Mat. Sb. 112 (154) (1980), N2; English Translation in Math. USSR Sb. 40 (81), 149–155.
7. *On the Convergence of Simultaneous Padé Approximants for Systems of Functions of Markov Type*, (with A. A. Gonchar), Trudy Mat. Inst. Steklov 157 (1981), 31–48; English Translation in Proc. Steklov Inst. Math. 1983, No. 3 (157).
8. *Estimates of the Growth of Orthogonal Polynomials Whose Weight is Bounded Away From Zero*, Doklady of Acad. of Sci. of USSR, (1981); English Translation in Math. USSR Sb.
9. *Estimates of the Growth of Orthogonal Polynomials Whose Weight is Bounded Away from Zero*, Mat. Sb. (1981); English Translation in Math. USSR Sb.
10. *On Asymptotic Properties of Polynomials Orthogonal on the Real Axis*, Doklady of Acad. of Sci. of USSR, (1982); English Translation in Math. USSR Sb. 47 (1984).
11. *On Asymptotic Properties of Polynomials Orthogonal on the Real Axis*, Mat. Sb. 119 (161) (1982), 163–203; English Translation in Math. USSR Sb. 47 (1984).
12. *On the Asymptotic of the Ratio of Orthogonal Polynomials: II*, Mat. Sb. 118 (160), 1982, 104–117; English Translation in Math. USSR Sb. 46 (1983), 105–117.
13. *Asymptotic Properties of Orthogonal Polynomials*, Doctoral Dissertation, Steklov Math. Inst., Moscow, 1983 (in Russian).
14. *Asymptotic Properties of Orthogonal Polynomials*, Thesis of Doctoral Dissertation, Steklov Math. Inst., Moscow, 1983 (in Russian).
15. *Equilibrium Measure and the Distribution of Zeros of Extremal Polynomials*, (with A. A. Gonchar), Mat. Sb. 125 (167) (1984, No. 1); English Translation in Math. USSR Sb. 53(1986), 119–130.
16. *On the Equilibrium Problem for the Vector Potentials*, Uspekhi Mat. Nauk **40** (1985), No. 4, (244), 155–156 (with A. Gonchar); English Translation in Russian Math. Surveys **40** 1985.
17. *On Asymptotic Properties of Orthogonal Polynomials on the Circle With Weights Not Satisfying the Szegő Condition*, Math. Sb. 130 (172) (1986), 157–169; English Translation in Math. USSR Sb. 58 (87).

18. *Equilibrium Distributions and Degree of Rational Approximation of Analytic Functions*, (with A. A. Gonchar), Mat. Sb. 134 (176) (1987); English Translation in Math. USSR Sb. 62 (1989), 305–348.
19. *Rational Approximations, Orthogonal Polynomials and Equilibrium Distributions*, (with G. Lopez), Lecture Notes In Mathematics 1329 (1988); Proceedings of Segovia (1986).
20. *On the Rate of Convergence of Padé Approximants for Orthogonal Expansions*, (with A. A. Gonchar and S. P. Suetin), Proc. of Tampa (1989) In: Progress in Approximation Theory, An International Perspective, Springer-Verlag, New York 1992.
21. *Strong Asymptotics for Orthogonal Polynomials Associated with Exponential Weight on \mathbb{R}* , in “Methods of Approximation Theory in Complex Analysis and Mathematical Physics”, A. A. Gonchar and E. B. Saff eds., 71–97, Moscow, “NAUKA”, 1992.
22. *Electrons on the sphere*, (with Y. M. Zhou and E. B. Saff), Computational Methods and Function Theory (CMFT '94), R. M. Ali, S. Ruschewayh and E. B. Saff eds., 293–309.
23. *Minimal Discrete Energy on the Sphere*, (with Y. M. Zhou and E. B. Saff), Mathematical Research Letters, I (1994), 647–662.
24. *Rational Approximation with Varying Weights I*, (with P. Borwein and E.B. Saff), Constructive Approximation 12, 223–240, 1996.
25. *Equilibrium Measure and the Distribution of Zeros of the Extremal Polynomials of a Discrete Variable*, Math. Sb. 187; 8 1213–1228 (1996).
26. *Existence and regularity for an energy maximization problem in two dimensions*, J. Math. Phys., 46, no 8 (2005).
27. *Bound for polynomials with a unit discrete norm*, Annals of Math.,165, pp. 55–88, 2007.
28. *On asymptotics of Hermite-Pade polynomials for a couple of Markov-type functions*, Math. Sb, (to appear).
29. *Critical measures, quadratic differentials and weak limits of zeros of Stieltjes polynomials*, Arxiv:0902.0193, 2009 (with A. Martínez-Finkelshtein).
30. *On asymptotic behavior of Heine-Stieltjes and Van Vleck polynomials*, Contemporary Mathematics (to appear) (with A. Martínez-Finkelshtein),

Career Summary

Research Areas

Complex analysis, constructive methods of approximations of analytic functions, orthogonal polynomials, potential theory. I solved, in particular, a number of longstanding problems in these areas (Steklov's problem, Freud's problem, problem of the rate of convergence of Padé approximants for Stieltjes series, problem of the rate of convergence of rational approximants for exponential function and others). Those results have had an important influence on the further development of these areas. Recently a classical problem of asymptotics for Heine-Stieltjes and Van Vleck polynomials has been solved in my my joint papers with A.Martinez.

Teaching

I has been teaching for four years at Moscow State University on the graduate and undergraduate levels. In particular undergraduate Complex Analysis (1988 - 1991) and graduate courses Padé Approximants (1989), Special Topics in Complex Analysis (1990), Rational Approximations of Analytic Functions (1991). Served as organizer and head of the research seminar "Selected Problems in the Theory of Functions" Directed Ph.D. dissertation for V. Buyarov and MS-thesis for K. Perevoznikova.

Since 1992 I teach in USF at the undergraduate and graduate levels. Courses in complex analysis, special functions, approximation theory, real analysis, numerical analysis, differential equations, calculus, linear and computational algebra, finite mathematics, college algebra.

Served as a member of Doctorial Dissertation Committees for Yanmu Zhou 1994–1995, Vladimir Veselov 1994–1995, Peter Dragnev 1994–1995 Plamen Simeonov 1995–1996, Ivan Ivanov 1996–1996, Viktor Maimeskul 1999-2000, Joel Johnson 1999-2001, David Benko 2000-2001 Joseph Quarqoo 2005-2006, Ferenc Tookos, Robney Taylor 2007-2008, Elliot Findley 2006-2007, Eric Lundberg 2008-now

Service and Administration

State Expert for Mathematics and Mechanics of USSR (Russia) in 1989–1994. Member of editorial board of Journals "Analysis Mathematika" in 1988–1992, Constructive Mathematics and Functional Analysis since 2005. Since 1977 I regularly serve as a referee for several leading mathematical journals.