

Maxim A. Olshanskii

Personal:

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- Electronic Mail: Maxim.Olshanskii@mtu-net.ru, molshan@emory.edu
- WWW : <http://www.mathcs.emory.edu/~molshan>
- Date of birth: August 2, 1971
- Place of birth: Moscow, Russia

Education:

- Ph.D. Mathematics, Moscow State University, November 1996
- M.S. Department of Mechanics and Mathematics, Moscow State University, 1993

Doctoral Dissertation: Some questions of numerical simulation of unsteady incompressible Navier-Stokes flows in primitive variables, November 1996, Prof. G.M.Kobelkov, advisor.

Second Doctoral Dissertation (Habilitation thesis): Robust multigrid and preconditioned iterative methods, November 2006 from the Institute of Numerical Mathematics of Russian Academy of Science

Research Interests:

Numerical analysis for partial differential equations, Numerical linear algebra, Computational Fluid Dynamics, Multigrid and multilevel methods, Multi-phase and interface flows.

Positions Held:

- 9/09–present **Professor**
Department of Mechanics and Mathematics
Moscow M.V.Lomonosov State University
Moscow, Russia
- 9/01–8/09 **Docent**
Department of Mechanics and Mathematics
Moscow M.V.Lomonosov State University
Moscow, Russia
- 2/00–12/00 **Post-Doctoral Fellow**
Chair of Numerical Mathematics
Institute for Geometry and Applied Mathematics
RWTH-University in Aachen
Aachen, Germany

- 1/97–8/01 **Research fellow with teaching duties**
Department of Mechanics and Mathematics
Moscow M.V.Lomonosov State University
Moscow, Russia
- 2/06–present **Adjunct associate professor**
Department of Mathematics and Computer Sciences
Emory University
Atlanta, USA

Visiting Positions Held:

- 9/05–2/06 **Visiting associate professor**
Department of Mathematics and Computer Sciences
Emory University
Atlanta, USA
- 2/04, 2/05, **Guest professor** of the SFB project
and 2/08 “Model-based Experimental Analysis of Kinetic Phenomena
in Fluid Multi-phase Reactive Systems”
Institute for Geometry and Applied Mathematics
RWTH-University in Aachen
Aachen, Germany
- 6/02–7/02 **Visiting researcher**
Chair of Numerical Mathematics
Institute for Geometry and Applied Mathematics
RWTH-University in Aachen
Aachen, Germany
- 9/01–2/02 **Visiting assistant professor**
Department of Mathematics
Vanderbilt University
Nashville, USA

Part-time Positions Held:

- 01/93–12/02 **Part-time research fellow**
Computing Laboratory
Institute for Social and Economic Studies of Population
Russian Academy of Sciences
Moscow, Russia

Grants and projects:

- Russian Foundation for Basic Research project No 09-01-00115: “The development and analysis of iterative methods for approximate solution of Non-Newtonian fluid equations” , (2009–2011)
- Russian Foundation for Basic Research project No 08-01-00159: “Novel computational technologies for hydrodynamic problems with free interior boundary”, (2008–2010) (joint with Yu.V.Vassilevski)

- Russian Academy of Science program “Contemporary problems of theoretical mathematics”, project No. 01.2.00104588 (PI V.I.Lebedev)
- Russian Foundation for Basic Research project No 08-01-00415, (2008 -2010) (PI G.M.Kobelkov)
- German Scientific Research Foundation and Russian Foundation for Basic Research project (DFG-RFBR) (“Robust and efficient solution strategies for generalized incompressible Navier-Stokes equations ”), 2006-2008 (co-PI with S.Turek).
- Dutch-Russian project “Robust Numerical Methods and Computational Technologies for Singularly Perturbed Multiscale Problems”, NWO-RFBR 047.016.008 (2004-2006) (PI G.I.Shiskin).
- Russian Foundation for Basic Research project, No 05-01-00846, (2005–2007) (PI G.M.Kobelkov)
- Russian Foundation for Basic Research project, No 02-01-00592, (2002 -2004) (PI G.M.Kobelkov)
- Russian Foundation for Basic Research project, No 99-01-00263, (1999 -2001) (PI G.M.Kobelkov)
- Russian Foundation for Basic Research project, No 96-01-01254, (1996-1998) (PI G.M.Kobelkov)
- European Committee (INTAS) and Russian Foundation for Basic Research grant, No 95-00098, (1997-1999) (PIs O.Axelsson and N.S.Bakhvalov)
- European Committee (INTAS) project, No project 93-377ext, (1997-1998) (PIs O.Axelsson and N.S.Bakhvalov)
- Grant for leading scientific groups of Russian Academy of Science, No 96-15-96161 (1996-1999) (PI N.S.Bakhvalov)
- Numerous travel grants/ visiting supports were recieved from RFBR, SFB, universities and conferences organizers.

Honors and Awards:

- Emory University Adjunct Associate Professor from 2006
- Emory University Emerson Center’s Fellowship for 2006-2007
- Grant of the Moscow Government “Docent 2004” : “For the excellence in teaching and research” (former Soros educational program grant)
- M.I.T. Fellowship: “The Young Researcher Fellowship Award for exemplary research in computational mechanics” (2003)
- Prize of the European Academy for Russian young scientists in section “Mathematics” (8th contest, 2001)
- Russian Foundation for Basic Research grant for young scientists in 2003
- Russian Foundation for Basic Research grant for young scientists in 2002
- Selected in the distinguished “elite group” and awarded a grant for young scientists by the Russian Foundation for Basic Research in 2001

- European Committee (INTAS) Fellowship for Young Scientists in 1998/99 acad. year.
- CSMEE grant for ICM98 participant (1998)

Books and Thesis:

- *Short course on multigrid and domain decomposition methods*, Moscow State University: MAKS-Press, Moscow 2007. (in russian) (joint with Yu.V.Vassilevski)
- *Lectures and exercises in multigrid methods* Fizmatlit: Moscow 2005.
- *Robust multigrid and preconditioned iterative methods*, Habilitation Thesis, (Defended in November 2006)
- *Some questions of numerical simulation of unsteady incompressible Navier-Stokes flows in primitive variables*, Ph. D. thesis, Mosc. Univ., Dept. of Mechanics and Mathematics, November 1996

Research papers:

1. Olshanskii M.A., Lube G., Heister T., Löwe J., Grad-Div stabilization and subgrid pressure models for the incompressible Navier-Stokes equations, *Comp. Meth. Appl. Mech. Eng.* **198** (2009) 3975–3988
2. Olshanskii M.A., Rebholz L.G., A note on helicity balance of the Galerkin method for the 3D Navier-Stokes equations, to appear in *Comp. Meth. Appl. Mech. Eng.*
3. Benzi M., Olshanskii M.A., Wang Z., Modified augmented Lagrangian preconditioners for the incompressible Navier-Stokes equations, to appear in *Int. J. Numer. Meth. Fluids* (2009)
4. Olshanskii M.A., Rebholz L.G., Velocity-Vorticity-Helicity formulation and a solver for the Navier-Stokes equations, submitted, June 2009 (available online as TR-2009-019 of Dept. Math. and Comp. Sci., Emory University)
5. Manica C.C., Neda M., Olshanskii M.A., Rebholz L.G., Enabling numerical accuracy of the Navier-Stokes-alpha through deconvolution and enhanced stability, submitted, May 2009 (available online as TR-2009-017 of Dept. Math. and Comp. Sci., Emory University)
6. Olshanskii M.A., Grinevich P.P., An iterative method for the Stokes type problem with variable viscosity, *SIAM J.Sci.Comp.* **32** (2009), 3959–3978
7. Olshanskii M.A., Reusken A., A finite element method for surface PDEs: Matrix properties, *Numerische Mathematik*, (2009), DOI: 10.1007/s00211-009-0260-4.
8. Olshanskii M.A., Multigrid analysis for the time dependent Stokes problem, submitted, (available online as TR-2008-017 of Dept. Math. and Comp. Sci., Emory University)
9. Olshanskii M.A., Analysis of semi-staggered finite-difference method with application to Bingham flows, *Comp. Meth. Appl. Mech. Eng.* **198** (2009), 975–985
10. Olshanskii M.A., Reusken A., Grande J., A Finite Element method for elliptic equations on surfaces, *SIAM J. Numer. Anal.* **47** (2009), 3339-3358

11. Layton, W., Manica, C.C., Neda, M., Olshanskii M.A., Rebholz, L.G., On the accuracy of the rotation form in simulations of the Navier-Stokes equations, *Journal of Computational Physics* **228** (2009), 3433–3447
12. Olshanskii M.A., Sokolov A., Turek S., Error analysis of a projection method for the Navier-Stokes equations with Coriolis force, *Journal of Mathematical Fluid Mechanics* (2009) DOI 10.1007/s00021-009-0299-0
13. Muravleva E.A., Olshanskii M.A., Two finite-difference methods for the Bingham cavity flows, *Rus. J. Num. Anal. Math. Model.* **23** (2008), 615–634
14. Sokolov A., Turek S., Olshanskii M.A., Numerical study of a discrete projection method for rotating incompressible flows, *Electronic Transactions on Numerical Analysis*, V. 32 (2008), 49–62; Special Volume: Selected Papers from the 20th Chemnitz Finite Element Symposium
15. Sokolov A., Olshanskii M.A., Turek S., A discrete projection method for incompressible viscous flow with Coriolis force, *Comp. Meth. Appl. Mech. Eng.* **197** (2008), 4512–4520
16. Olshanskii M.A., Benzi M., An augmented Lagrangian approach to linearized problems in hydrodynamic stability, *SIAM J.Sci.Comp.*, **30** (2008), 1459–1473
17. Olshanskii M.A., Vassilevski Yu.V., Pressure Schur complement preconditioners for the discrete Oseen problem, *SIAM J.Sci.Comp.*, **29** (2007), 2686–2704
18. Benzi M., Olshanskii M.A., An augmented lagrangian-based approach to the Oseen problem, *SIAM J.Sci.Comp.*, **28** (2006), 2095–2113
19. Olshanskii M.A., Peters J., Reusken A., Uniform preconditioners for a parameter dependent saddle point problem with application to generalized Stokes interface equations, *Numerische Mathematik*, **105** (2006), 159–191.
20. Olshanskii M.A., Reusken A., Analysis of a Stokes interface problem, *Numerische Mathematik*, **103** (2006), 129–149.
21. Gelhard T, Lube G., Olshanskii M.A., Starcke J.-H., Stabilized finite element schemes with LBB-stable elements for incompressible flows, *J. Comput. Appl. Math.*, **177** (2005), 243–267.
22. Olshanskii M.A., Analysis of a multigrid method for convection-diffusion problem with Dirichlet boundary conditions, *Journal of Computational Mathematics and Mathematical Physics*, **44** (2004), 1462–1491.
23. Olshanskii M.A., Reusken A., Convergence analysis of a multigrid solver for a finite element method applied to convection-dominated model problem, *SIAM J.Num.Anal.*, **43** (2004), 1261–1291.
24. Olshanskii M.A., Reusken A., A Stokes interface problem: stability, error estimate and a solver, in *Proc. of European Congress on Computational Methods in Applied Sciences and Engineering, ECCOMAS 2004* (Eds. P. Neittaanmäki, etc.), 2004.
25. Olshanskii M.A., Reusken A., Grad-Div stabilization for the Stokes equations, *Math.Comp.*, **73** (2004), 1699–1718.

26. Olshanskii M.A., Preconditioned iterations for the linearized NavierStokes system in rotation form, in *Computational Fluid and Solid Mechanics 2003*, K.J. Bathe (Editor) , Elsevier, 2003, 1074–1077
27. Olshanskii M.A., A low order Galerkin finite element method for the Navier-Stokes equations of steady incompressible flow: A stabilization issue and iterative methods, *Comp. Meth. Appl. Mech. Eng.*, **191** (2002), 5515–5536
28. Olshanskii M.A., Reusken A., Navier-Stokes equations in rotation form: a robust multigrid solver for the velocity problem, *SIAM J. Sci. Comp.*, **23** (2002), 1682–1706
29. Lube G., Olshanskii M.A., Stable finite element calculations of incompressible flows using the rotation form of convection, *IMA J. Num. Anal.*, **22** (2002), 437–461.
30. Olshanskii M.A., Reusken A., On the convergence of a multigrid method for linear reaction-diffusion problems, *Computing*, **65** (2000), 193–202.
31. Chizhonkov E.V., Olshanskii M.A., On the domain geometry dependence of the LBB condition. *Math. Modelling Numer. Anal.: M²AN*, **34** (2000), 935–951.
32. Olshanskii M.A., Chizhonkov E.V., On the asymptotic of the constant from infsup condition in elongated domains, *Mathematical Notes*, **67** (2000), 387–396.
33. Kobelkov G.M., Olshanskii M.A., Effective Preconditioning of Uzawa Type Schemes for Generalized Stokes Problem, *Numerische Mathematik*, **86** (2000), 443–470.
34. Olshanskii M.A., Staroverov V.M., On Simulation of the Outflow Boundary Conditions in FD Calculations for Incompressible Fluid, *Int. J. Numer. Meth. Fluids*, **33** (2000), 499–534.
35. Olshanskii M.A., Iterative solver for Oseen problem and numerical solution of incompressible Navier-Stokes equations, *Num. Linear Algebra Appl.*, **6** (1999), 353–378.
36. Olshanskii M.A., Two-Level Method and Some A Priori Estimates in Unsteady Navier-Stokes Calculations, *J. Comput. Appl. Math.*, **104** (1999), 173–191.
37. Olshanskii M.A., A robust iterative solver in simulation of unsteady incompressible Navier-Stokes flow, *Proc. Fourth Europ. Comput. Fluid Dynamic Conf.*, V.1, (Eds. R.Papailiou, etc.), Willey, Chichester, etc., 1998, 1296–1301.
38. Olshanskii M.A., On Preconditioning Techniques for Generalized Stokes Problem, *Proc. Conf. on Precond. Iter. Solution Meth. in Large Scale Probl. in Scientific Comp.*, eds. O.Axelsson, M.Neytcheva, B.Polman, Nijmegen, the Netherlands, 1997, 137–144
39. Olshanskii M.A., On the Stokes problem with model boundary conditions, *Sbornik: Mathematics*, **188** (1997), 127–144.
40. Olshanskii M.A., An exact numerical method for solving the Stokes type factorized problem, *Journal of Computational Mathematics and Mathematical Physics*, 1997, V.37, N2, pp.198–209
41. Olshanskii M.A., The Stokes problem with a parameter, *Journal of Computational Mathematics and Mathematical Physics*, **36** (1996), 75–86.

42. Kobelkov G.M., Olshanskii M.A., Staroverov V.M. To numerical solution of the Stokes problem, Proceedings of the conf. on Appl.Math. and Comp.Science, Moscow, 1996, pp.27-39
43. Olshanskii M.A., On numerical solution of nonstationary Stokes equations, *Russ. J. Numer. Anal. Math. Modelling.*, 1995, V.10, N1, pp.81-92
44. Olshanskii M.A., On one iterative method for numerical solution of the Stokes problem, *Vestnik MGU, Ser. 15*, 1993, N2, pp.72-77 (in Russian)

Presentations:

Invited:

- Colloquium talk, Clemson Univ. (Oct. 2009)
 Numerical Analysis seminar in Emory Univ. (Oct. 2009)
 European Conference on Numerical Mathematics and Advanced Applications, ENUMATH 2009, Uppsala, Sweden;
 Advances and Perspective on Numerical Methods for Saddle Point Problems, Banff, Canada, April 2009
 Numerical analysis seminar of IGPM, RWTH-Aachen (Jan. 2009)
 Numerical analysis seminar and Graduate-college seminar of the University Goettingen (Jan. 2009)
 X Belorussian mathematic conference (with plenary talk in sect. "Comput. Mathem.", Nov. 2008)
 MIDNAG workshop on Computational Methods for Non-Newtonian flows (Oct. 2008, Birmingham)
- Applied Mathematics Seminar of Birmingham Univ. School of Mathematics (Oct. 2008)
 "Workshop on Reliable Modelling and Scientific Computing"(August 2008 , Juvaskyla)
 ECCOMAS 2008 (July, 2008 , Venice)
 Colloquium of Ins. of Mathematics of Belorussian Academy of science (June, 2008)
 "2nd International Conference on matrix methods and operator equations" (July, 2007 , Moscow, Russia) (with plenary talk)
 3d International Conference Computational Methods in Applied Mathematics (June, 2007, Minsk, Belarus) (with plenary talk)
 12th International Conference "Mathematical Modelling and Analysis" (June, 2007, Lithuania)
 6th International Congress on Industrial and Applied Mathematics, (July, 2007, Zurich) (minisymposium organizer)
- Colloquium talk in Emory Univ. (Oct. 2007)
 "SIAM Conference on Computational Science & Engineering " (February, 2007 , Costa Mesa, CA)
 "Modern problems of Computational Mathematics" (Moscow, INM RAS 2006)
 Colloquium of Inst. of Geometry and Applied Math. , RWTH-Aachen (2006);
 "Boundary and Interior Layers 2006" (Goettingen 2006);
 "Computational Methods for Multidimensional Flows" conference, Heidelberg, 2005
 Applied Mathematics seminar on Math. Dept. of Georgia Tech. Univ. (Atlanta, 2005)
 Numerical Analysis group seminar in Emory University (Atlanta, 2005)
 Workshop "Robust numerical methods for singular-perturbed problems" MSU Moscow (2005)
 Numerical analysis seminar IWR Heidelberg University (2004)
 Graduirtenkolleg of the University Goettingen (2004)
 Colloquium of the Mathematical Department of the Vanderbilt University (2003)
 Colloquium of Inst. Geometry Applied Math., RWTH-University in Aachen (2002)

Colloquium of Inst. of Applied and Numerical Math. of Univ. of Goettingen (2002)
 Numerical Analysis Seminar of the University of Maryland (2001)
 Colloquium of the Mathematical Department of the Vanderbilt University (2001)
 Math. seminar of the Institute of Energy in Moscow (2001)
 Seminar on Numerical Analysis in the Dortmund University (2000)
 Graduirtenkolleg of the University Goettingen (2000)
 Colloquium of Inst. of Geometry and Applied Math. , RWTH-Aachen (2000);
 Graduirtenkolleg of the University of Goettingen with short course “Towards robust iterative solvers for problems in fluid dynamics”(1999)
 Colloquium of Inst. of Applied and Numerical Math. of Univ. of Goettingen (1999)
 Research seminar of Inst. of Analysis and Numerics of Univ. of Linz (1999)
 Research seminar of Numerical Methods Group in Inst. of Applied Mathematics, University of Heidelberg (1998)
 Workshop ‘Robust numerical solution methods for convection- diffusion and Navier-Stokes equations’ (Amsterdam-Nijmegen, Holland 1998).

Contributed: Numerous conferences around the world.

Teaching Experience:

Defended PhD student: A. Sokolov in January 2009 with theses: “Analysis and Numerical Realisation of Discrete Projection Methods for Rotating Incompressible Flows”
 Supervisor for 1 PhD student: P. Grinevich
 Co-supervisor for 1 PhD students: R.Yakubuk (with P.Matus)

I am teaching in MSU Math Dept. since 1996. Before this I gave classes (seminars) in Natural science dept. of MSU. in 1995/96 and 1994/95. My classes included undergraduate courses and seminars in Computational mathematics and Scientific Computing, as well as graduate courses on various topics of numerical analysis.

Also: in 2005/2006 ”Numerical PDEs I” graduate course at Dept. Math. and CS of Emory Univ., and in 2001/2002 graduate course at Dept. of Math. Vanderbilt Univ. ”Preconditioned and multigrid iterative methods and application to computational fluid dynamics”

Service for the community:

On the editorial board of
Central European Journal of Mathematics
Computational Methods in Applied Mathematics

Organizer of the Dutch-Russian workshop “Robust numerical methods for singular-perturbed problems” MSU Moscow (2005)
 Minisymposium co-organizer “Fast solvers for saddle-point problems with applications in fluid dynamics ” ICIAM07, Zurich (2007)
 In the programm committee of the “2nd International Conference on matrix methods and operator equations” (2007, Moscow, Russia)
 Minisymposium co-organizer “Advances in numerical methods for non-Newtonian flows” Enumath 2009, Uppsala (2009)
 Co-organizer of the workshop: ”Advances on numerical methods for multiphase and free surface flows” Moscow, June 2009

Referee for many journals, including *SIAM Journal on Scientific Computing*, *SIAM Journal on Numerical Analysis*, *Numerical Linear Algebra with Applications*, *Journal of Computational and Applied Mathematics*, *Computer Methods for Applied Mechanics Engineering*, *Journal of Computational Physics*, *Journal of Computational Fluid Dynamics*, *Journal of Computational Mathematics and Mathematical Physics*, *Journal of Computers and Structures*, *Computational Methods in Applied Mathematics*, *Mathematical Modelling and Analysis*, *Electronic Transactions on Numerical Analysis*, *IMA J. Numerical Analysis*,

Related experience:

Active programming on C/C++;

Other experience:

Research fellow in a speech recognition project with IBM branch for East-South Europe (Rome 1995); Experience with sociological data processing and “in field” activities; Participation in several social and economic oriented research projects.